FINAL REPORT
NOVEMBER 2000

PHASE I REMOTE SENSING MARINE ARCHEOLOGICAL SURVEY OF NORTH PRONG IN SCHOONER BAYOU, VERMILION PARISH, LOUISIANA

Contract No. DACW29-97-D-0018
Delivery Order 0027

PREPARED FOR:

U.S. Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, Louisiana 70160-0267

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R. CHRISTOPHER GOODWIN & ASSOCIATES, INC.
241 EAST FOURTH ST., SUITE 100 • FREDERICK, MD 21701

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

October 12, 2000

Planning, Programs, and
Project Management Division
Environmental Planning and
Compliance Branch

To The Reader:

This cultural resource effort was designed and guided by the U.S. Army Corps of Engineers, New Orleans District, as part of our cultural resource management program. The contractor, R. Christopher Goodwin & Associates, Inc., conducted a thorough archeological investigation of the project area. No significant cultural resources will be affected by construction of this project. We concur with the findings and recommendations in the report. The Louisiana State Historic Preservation Officer also concurs with the conclusions and recommendations. The contractor is to be commended for excellent field work and timely completion of this project.

Dr. Edwin Lyon
Contracting Officer's
Representative

David F. Carney
Chief, Environmental
Planning and Compliance
Branch

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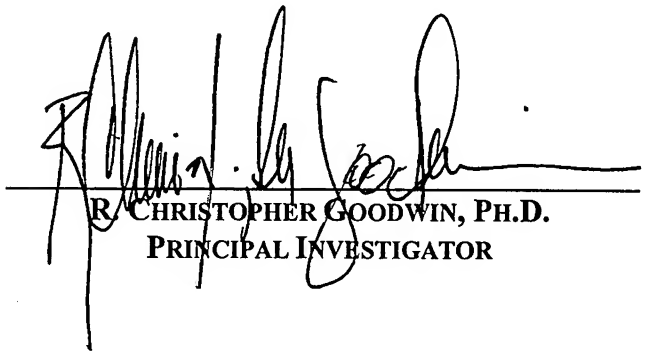
FINAL REPORT



R. CHRISTOPHER GOODWIN, PH.D.
PRINCIPAL INVESTIGATOR

BY

JEAN B. PELLETIER, M.A., SARAH A. MILSTEAD, B.A., LARKIN A. POST, B.A.,
CATHY LABADIA, M.A., ABD, COLLEEN HANRATTY, B.A., AND
CARRIE SOWDEN, B.A.

R. CHRISTOPHER GOODWIN & ASSOCIATES, INC.
241 EAST FOURTH STREET, SUITE 100
FREDERICK, MARYLAND 21701

NOVEMBER 2000

FOR

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160

ABSTRACT

A Phase I Marine Archeological Remote Sensing Survey was conducted along a segment of the North Prong in Schooner Bayou, Vermilion Parish, Louisiana in support of a proposed Bank Line Stabilization project. The project area is located in North Prong, between the Gulf Intracoastal Waterway (GIWW) and Schooner Bayou, north of the Schooner Bayou Control Structure. The proposed repair and maintenance project will require the dredging of the navigation channel in the GIWW, and the North Prong.

In keeping with the New Orleans District's mission to preserve, document, and protect significant cultural resources, this magnetic and acoustic remote sensing survey was undertaken to locate potential archeological remains and in so doing, assist the USACE-NOD in satisfying its responsibilities under Section 106 of the National Historic Preservation Act of 1966, as amended.

The survey area for this project consisted of one block representing approximately 517 total acres located alternately on both the right and left descending banks of the North Prong. In total, approximately 8.5 linear miles of river bottom were surveyed.

The primary objectives of this study were to identify specific targets that might represent significant submerged cultural resources within the project area, and to provide the USACE-NOD with management recommendations for such resources. These objectives were met with a research design that combined background archival investigations and a marine archeological remote sensing survey.

In the analysis of magnetic data, particular attention was paid to those magnetic anomalies that comprise areas of high density, clusters of anomalies, and single anomalies of unusually high amplitude, duration, or those exhibiting complex magnetic signatures. A total of 51 individual magnetic anomalies were identified by this survey. Twenty-two of the 51 magnetic anomalies were significant enough to be clustered into nine target groups for further study. These target groups then were individually magnetically contoured for further analysis.

Additionally, seven individual acoustic anomalies also were detected during the survey of Schooner Bayou. Of these acoustic anomalies, one correlated with two magnetic anomalies (Target #1). All of the acoustic anomalies represent modern disturbances such as pipelines, bulkheads, bank debris, or modern ferrous debris. These anomalies do not represent significant cultural resources.

None of the nine magnetic/acoustic target groups represented structures that would constitute a shipwreck or other significant cultural resource. Seven of the targets represented modern ferrous scatter (Targets #1, #2, #4-#6, #8 and #9). One target represents a pipeline (Target #3), and one target represents a bulkhead that is along the riverbank (Target #7).

Further study is not required for any of the nine targets; they do not represent significant cultural resources. However, for safety reasons, avoidance is recommended for the pipeline crossing area.

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CHAPTER I

INTRODUCTION

This report presents the results of the Phase I Marine Archeological Remote Sensing Survey of a segment along the North Prong of the Schooner Bayou, Vermilion Parish, Louisiana (Figure 1). These investigations were conducted from March 8 – 11, 2000, by R. Christopher Goodwin & Associates, Inc. on behalf of the U.S. Army Corps of Engineers, New Orleans District (USACE-NOD) in support of the proposed Bank Line Stabilization project. The project area is located in North Prong, between the Gulf Intracoastal Waterway (GIWW) and Schooner Bayou, north of the Schooner Bayou Control Structure (Figure 2). The proposed repair and maintenance project will require the dredging of the navigation channel in the GIWW and the North Prong.

In keeping with the New Orleans District's mission to preserve, document, and protect significant cultural resources, a magnetic and acoustic remote sensing survey was undertaken to locate potential archeological remains and in so doing, assist the USACE-NOD in satisfying its responsibilities under Section 106 of the National Historic Preservation Act of 1966, as amended. All aspects of the investigations were completed in full compliance with the Scope-of-Work; 36 CFR 800, "Protection of Historic Properties;" the Abandoned Shipwreck Act of 1987 (43 U.S. C. 2101 – 2106); the Abandoned Shipwreck Guidelines, National Park Service; National Register Bulletin Nos. 14, 16, and 20; 36CFR 66; and the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (Federal Register 48, No 190, 1983).

The survey area for this project consisted of one block representing a total of approximately 517 acres located alternately on both the right and left descending banks of the North Prong. In total, approximately 8.5 linear miles of river bottom were surveyed.

Research Objectives and Design

The objectives of this study were to identify all submerged and visible watercraft and other maritime related cultural resources in the North Prong, Schooner Bayou project area, and, whenever possible, to assess the National Register of Historic Places (NRHP) eligibility of identified resources, applying the Criteria for Evaluation (36 CFR 60.4 [a-d]). These objectives were addressed through a combination of archival research and field survey. The cultural context and history of the project area were researched through examination of archeological site files for the State of Louisiana, local historical literature files, previous cultural resources investigations within the vicinity of the project area, historic maps, relevant primary map and microfilm, records, and secondary literature.

The project area consisted of one survey block with data collection conducted along four parallel track lines spaced at 25 ft intervals (intervals were controlled by river depth, width, and bankline snags encountered during the survey). The riverbanks along the North Prong were steep and deeply incised by slumps. The trees lining the bank (Figure 3) maintain the steep bank angle. Additionally, there is a low natural levee along the bank with marsh conditions beyond. Throughout the study area, sections of the

bank have had considerable dredge spoils deposited from pipelines and access channels for the oil industry.

The equipment array used for the Schooner Bayou survey included a DGPS, a proton precession marine magnetometer, a side scan sonar, and a digital recording fathometer. Field survey of the project area was conducted from the 24 ft research vessel *Coli,* leased from the Louisiana Universities Marine Consortium (LUMCON). Data were collected and correlated via a laptop computer using hydrographic survey software. Data were inventoried, post-processed, and analyzed to identify specific targets within the project area that might represent significant submerged cultural resources, and to provide the USACE-NOD with management recommendations for such resources.

R. Christopher Goodwin, Ph.D., served as Principal Investigator for this project. Mr. Jean B. Pelletier, M.A., served as Project Manager; he directed all aspects of data collection and its subsequent analysis. Mr. Pelletier was assisted by Nautical Archeologists and Remote Sensing Specialists, Sarah A. Milstead, B.A., and Larkin A. Post, B.A. Carrie Sowden, B.A., assisted with data analysis and Captain Samuel LeBouf operated the survey vessel.

Organization of the Report

This report develops the natural and historical contexts of the project area as the basis for analysis and interpretation. The geological setting of the project area is discussed in Chapter II. Chapter III develops the prehistoric cultural sequence. Chapter IV places the project area within its historic context, and develops an historic-chronological framework to allow evaluation of classes of historic sites. Chapter V presents previous investigations conducted in the area. Chapter VI reviews research methods and sources utilized during archival and background investigation, as well as instrumentation and methods employed during field survey and analysis. Chapter VII presents the results of the remote sensing survey. A summary of the study and management recommendations is provided in Chapter VIII.

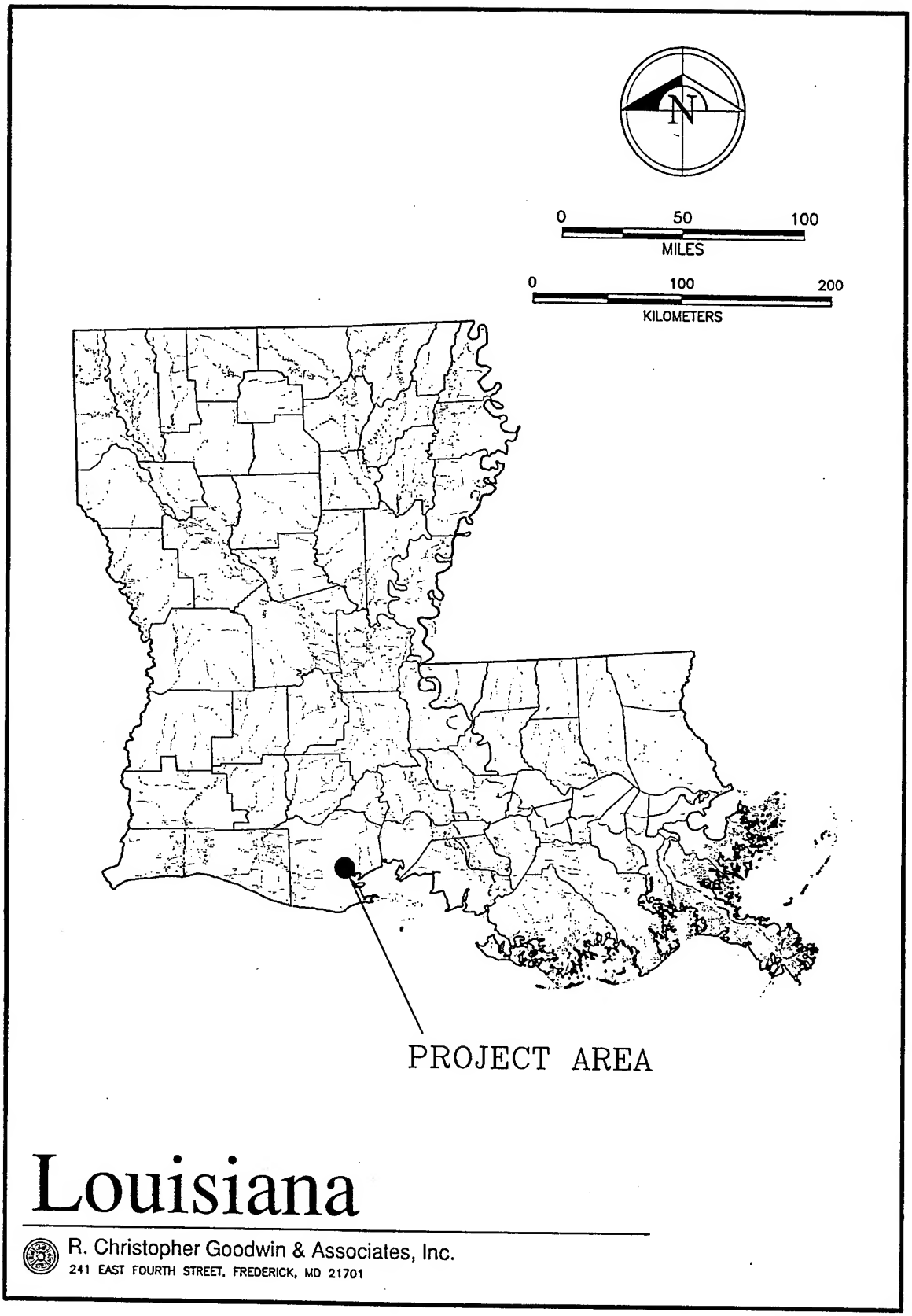

Figure 1. Map of Louisiana showing location of project.

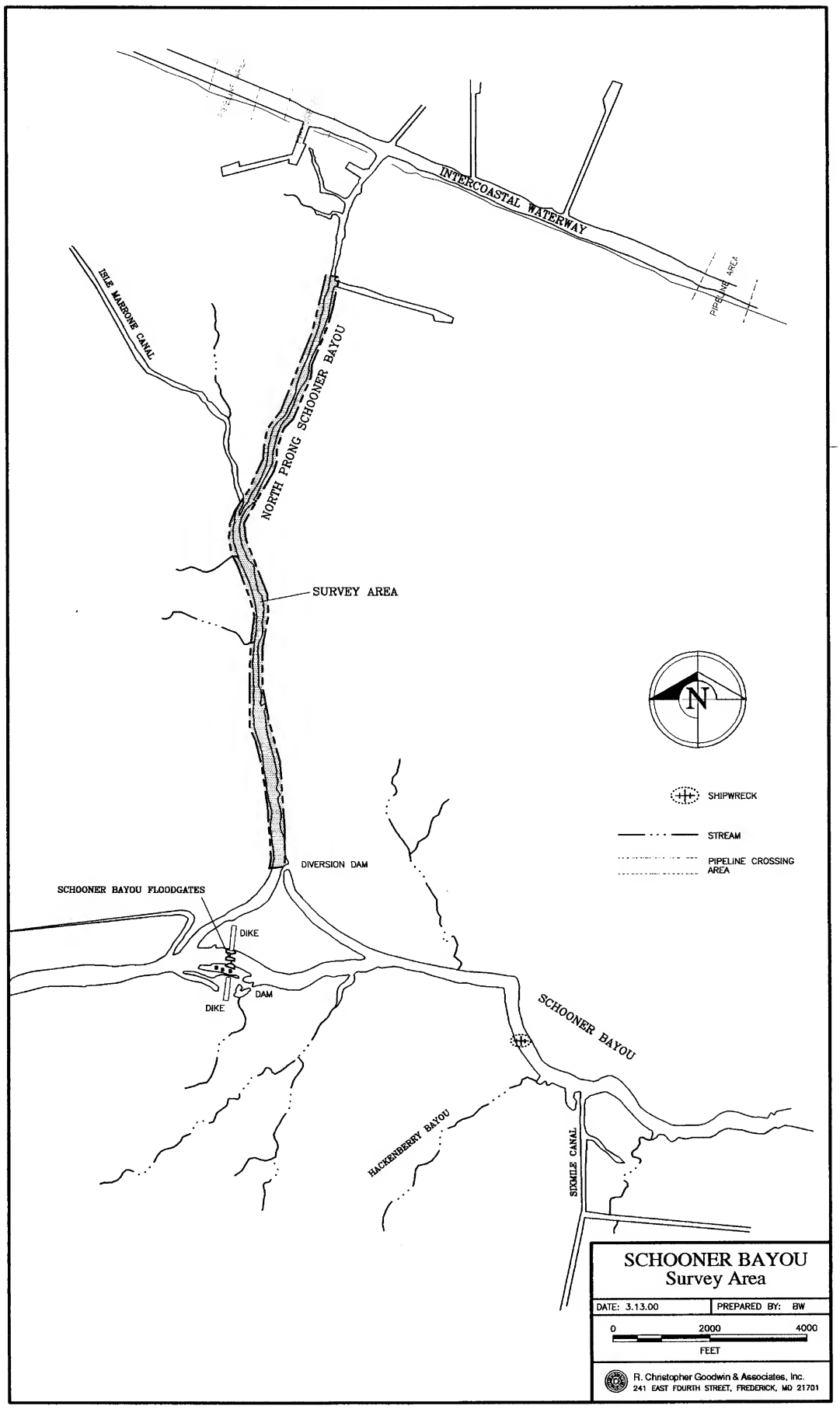

Figure 2. Schooner Bayou North Prong Project Survey Area.

Figure 3. Photograph of bank line in North Prong.

CHAPTER II

NATURAL SETTING

Introduction

The Schooner Bayou Bankline Stabilization Project area is located on North Prong in southeastern Vermilion Parish, Louisiana. North Prong is a small tributary that connects Schooner Bayou to the south and the Intercoastal Waterway to the north. This chapter identifies those processes that characterized the development of the project corridor and influenced the settlement and subsistence strategies characteristic of the prehistoric and historic populations of the area.

Regional Geomorphology

The proposed Schooner Bayou project is located within the general physiographic region of the West Gulf Coastal Plain section of the Gulf and Atlantic Coastal Plain province of North America (Murray 1961). More specifically, the proposed project area lies within a belt of Pleistocene coastwise terraces that stretch along the Gulf Coast. The current study area falls within the Teche Delta Complex, which served as the major distributary for the Mississippi River between 5,800 and 3,900 B.P.

Sea level rise was an integral factor in the deltaic cycles of progradation and transgression. Penland et al. (1991) document evidence indicating that the *rate* of sea level rise between 3,000 and 7,000 years ago was not steady, but fluctuated within the Gulf Coastal area or elsewhere in the world. Sea level rise was an integral factor in the deltaic cycles of progradation and transgression.

Holocene Age Delta Complexes

The Pleistocene Epoch, which began approximately 1.2 to 2 Ma (million years ago), encompassed a number of stages defined by their correlation with glacial events. During a glacial retreat, a huge amount of unconsolidated sediments were subject to erosion and much of the sediment generated throughout North America by these glacial events was transported through the Mississippi River drainage system and deposited in Louisiana and into the Gulf of Mexico. The oldest sedimentary depositions occurred during the Sangamonian stage, approximately 130,000 - 125,000 B.P., with further deposition occurring during the glacial retreat of the Middle Wisconsin stage, approximately 30,000 - 65,000 B.P. The Holocene Epoch (ca. 18,000 B.P. - present) also experienced periods of sediment deposition; the Teche Delta Complex resulted from one such depositional period (Saucier 1994).

Teche Delta Complex. The development of the Teche Delta Complex began around 5,800 B.P., after rising sea levels had submerged most of the Maringouin Delta Complex. Between 5,800 – 3,900 B.P., the Mississippi River formed the Teche Delta Complex by building over the intact Maringouin Delta Complex delta plain. East of the Penchant Shoreline, the Teche Delta Complex prograded into open water

over what had formerly been the Maringouin Delta Complex. The specific sequence in which the delta lobes developed, however, remains controversial (Smith et al. 1986:61-64; Weinstein and Kelley 1989:33-34; Weinstein and Gagliano 1985:123).

The eastern limit of progradation for the Teche Delta Complex also is a subject of debate. Smith et al. (1986:61-62) place the easternmost limit of this delta complex near Houma, Louisiana. In contrast, Weinstein and Gagliano (1985:123) argue that the eastern margin of the Teche Delta Complex lies 48.3 km (30 mi) east of Houma. They claim that southwest trending distributaries in the Terrebonne Delta Plain, such as Bayou Du Large and Mauvais Bois, are Teche distributaries that were reoccupied by the Lafourche Delta Complex (Weinstein and Kelley 1989:33).

During its existence, drastic changes occurred within the river courses that fed the Teche Delta Complex. First, the Mississippi River switched from Saucier's (1981:16) Meander Belt No. 4 to Meander Belt No. 3. For the first thousand years, Meander Belt No. 4 supplied sediment to the Teche Delta, until it was abandoned for Meander Belt No. 3 (Autin et al. 1991). Second, an abrupt aggradation of Meander Belt No. 3 caused it to abandon and bury an older meander belt, and to form the relict river course currently occupied by bayous Teche and Black. Finally, the Red River occupied this river course as the flow of the Mississippi River gradually shifted to the east into Meander Belt No. 2 about 3,900 years B.P. As a result, the Teche Delta Complex remained active as the Red River partially discharged its flow directly into the Gulf of Mexico (Goodwin et al. 1990).

The Teche Delta Complex consists of alternating beds of peat and deltaic sediments caused by the periodic deltaic deposition of sediments by both the Teche and Maringouin delta complexes, and by the accumulation of peats within the interdistributary bays. During periods of inactivity when the delta plain was covered by marsh, a blanket of peat accumulated across the subsiding delta plain (Coleman 1966). The time at which the Red River abandoned both its Bayou Teche course and the Teche Delta Complex has yet to be determined satisfactorily. Autin et al. (1991) suggest that it occurred about 2,500 B.P. Pearson (1986) and Weinstein and Kelley (1989:33-34) both argue, on the basis of archeological data, that it occurred about 1,800 – 1,900 B.P. With the abandonment of this delta, the area began to subside.

St. Mary Coastal Region

The project area lies within the St. Mary Coastal Region of the Mississippi Deltaic Plain. The region acts as the subaerial portion of the partially submerged delta plain of the Teche Delta Complex. Adjacent to the Prairie Terrace, the St. Mary Coastal Region delta plain consists of a narrow strip of delta plain that is covered almost entirely by freshwater marsh. Brackish-water marsh and a narrow band of salt water marsh, situated along the coastline, covers the rest of this region (Coleman 1966).

The coastline is characterized by deep embayments of the Vermilion and Cote Blanche bays. These bays are defined by passes formed by prominent points of land that protrude into the water between the coast and Marsh Island. These prominent points of land, Point Chevreul and Point Cypremort are formed by the natural levees of Bayou Sale and Bayou Cypremort, respectively.

Effects on Archeological Deposits

The Teche Delta Complex no longer is active; however, it was active and prograding for several thousand years at which time archeological deposits could have formed and been affected. While a delta is actively building seaward, two processes, vertical accretion and channel widening have a profound affect on

the surface and subsurface distribution of archeological deposits. These processes result either in the preservation, burial, or destruction of the associated archeological deposits.

Once a delta complex in this area is abandoned, it subsides into the Gulf of Mexico. The result of the subsidence is the landward movement of the shoreline, i.e., a "transgression," over the delta plain. During a transgression, three processes serve to destroy the delta plain and the natural and archeological deposits that form it. Both shoreface erosion and tidal channel migration erode the shoreline of the delta plain. Landward of this shoreline, the enlargement of the lakes and interdistributary bays of the delta that occurs in response to relative sea level rise destroys the delta plain and the aggradation of sediments that comprise it, actively destroying the natural levees and the archeological sites associated with them.

The study area has subsided to some extent following the natural progression of the abandonment of a major delta lobe, the Teche Delta, and its lack of replenishing sedimentary deposits. As a result, portions of the current study area that today are fresh water estuaries, marshes, and swamps, in fact, are subsided distributaries, levees, and interdistributary basins of former freshwater environments. Subsidence of these landforms, and the archeological sites situated on them, would be relatively gentle, and the natural accretion of organic sediments would cover and preserve most sites (Gagliano 1984:28). The freshwater environments surrounding these former terrestrial landforms would have been capable of supporting a variety of flora and fauna, as well as human habitation. Therefore, there is a very high probability that areas within the immediate vicinity of the current study area contain both terrestrial and now subaqueous cultural remains.

Soils

A review of the soil survey from Vermilion Parish identified the Allemands-Larose soil association as encompassing the proposed project area (Murphy and Libersat 1996). The Allemands-Larose Association is comprised of level, very poorly drained soils that have a peaty or clayey surface layer and mucky and clayey underlying material.

Allemands mucky peat has a 122 cm (48 in) layer of dark brown to black very fluid organic material. It is underlain by 30 cm (12 in) of black, very fluid mucky clay, followed by another 2 m (6.6 ft) of gray, very fluid clay. Allemands soils are ponded with several inches of fresh water most of the year. During periods when the soil is not flooded, the water table does not exceed 15 cm (0.5 ft) below the surface (Murphy and Libersat 1996: 16-17). The entire project area is composed of this soil type.

Larose mucky clay contains a 15.2 cm (6 in) layer of dark gray very fluid mucky clay as a surface layer. Below this layer, there is a black very fluid mucky clay that measures approximately 60 cm (24 in) in thickness. It is underlain by 1.5 m (60 in) of dark gray, very fluid clay.

Flora and Fauna

A majority of the current study area can be described as Chenier Plain Marsh, and most of the marshes throughout Vermilion Parish resulted from the inundation of the Prairie Formation, which occurred when sea level reached and maintained its present elevation. The freshwater marshes consist of interior marshes and they mainly are found in a relatively large area around White Lake. The brackish marshes are positioned east of White Lake and they protect the freshwater marshes from intrusions of sea water; along the Gulf Coast in the southeastern and the southwestern corners of the parish lay the saline marshes (Murphy and Libersat 1996: 111-112).

The current study area includes levees and various semi-aquatic habitats including swamps, brackish, freshwater, and limited areas of saline marsh. Although these marshes are characterized by a lack of arboreal species, arboreal species are present both on the levees and in the seasonally flooded swamps. This composite of coastal habitats supports very rich floral and faunal communities.

Permanent residents of this habitat include muskrats, raccoons, otters, mink, alligators, rabbits, and a wide array of water birds, turtles, frogs, and fishes. The marshes also are an essential part of the estuary system that supports and acts as a nursery for a variety of marine species.

The habitats found throughout the immediate project area have been influenced strongly by natural and man-made forces. Through time, the changing course of the Mississippi River has controlled the amount of fresh water flowing down the Atchafalaya River and its related tributaries (e.g., the Vermilion River). Currently, the Atchafalaya River is diverted into the Teche-Vermilion system to supplement the low flows of Bayou Teche and the Vermilion River for seven months of the year. The proposed project area is located approximately 13.6 km (8.5 mi) west of where the Vermilion River drains into Vermilion Bay. The discharge of fresh water into the Vermilion Bay lowers the salinity of the bay; and in turn, the extent of brackish marsh along the shores of the Vermilion Bay is limited by the low salinity. Therefore, the extent of brackish and saline marshes may have been greater in the proposed project area when the discharge of the Mississippi River was directed elsewhere.

In addition, historic and modern modification of the proposed project area have greatly modified the habitats currently found there. Much of the current loss of freshwater marsh is due to the dredging and straightening of canals; these methods allow for saltwater intrusion from the Gulf of Mexico, which kills the sensitive vegetation of the freshwater marshes. If saltwater-tolerant species do not colonize the area, the marsh reverts to open water (Chabreck and Condrey 1979).

Saline Marsh

Small patches of saline marsh may be found directly adjacent to the Gulf of Mexico. These marshes therefore are inundated regularly with saltwater. The dominate plant species found throughout this area include salt grass, rushes, sea blite, and gulf croton. The growth of plants within the saline marsh is influenced by a long growing season, high rainfall, rich soils, low tide differentials, and the width of the marsh, which allows for varying levels of salinity (Chabreck and Condrey 1979:4).

A variety of crustaceans, shellfish, and fish are native to the saline marsh. Small fish such as silversides, minnows, killifish, and mullet are important to the predatory marine and estuary species, e.g., the flounder, stingray, tarpon, and drum populations within the area. Many other predatory fish feed on the small and immature crustaceans and shellfish in the saline marsh. Muskrats, otters, raccoons, and geese also exploit the floral and faunal resources of the area.

Brackish Marsh

Brackish marsh habitats, with their slightly saline waters, represent a small portion of the marsh habitats in the current project area.

The brackish marsh is inhabited by semi-aquatic mammals, birds, reptiles, and amphibians. Muskrat, mink, otter, raccoon, rabbit, nutria, and alligator also populate the brackish marshes, while white-tailed deer may venture into the brackish marsh to graze.

The brackish marsh also is part of the estuary system that serves as a nursery for saltwater fish, shrimp, and crabs. The presence of prehistoric period *Rangia* shell middens attest to the importance of brackish water shellfish to the ancient residents of southern Louisiana.

Fresh Marsh

Freshwater marsh habitats represent a significant portion of the marsh habitats associated with the overall project area. These marshes have very low salinity levels, i.e., zero to four millimhos per centimeter (Craft 1984:40). Common reed, panicoid grasses (e.g., *Panicum hermitomar*), cattail, bulrush, and giant cutgrass are the dominant native plants. Although monocotyledonous species still dominate this habitat, there are a few arboreal species such as black willow and wax myrtle.

Natural Levees

The natural levees situated along North Prong and Schooner Bayou and their numerous tributaries are the main non-aquatic habitats found throughout the immediate project area. Prehistoric and historic period human habitation of the overall project region most likely focused on such levees. The natural levees afforded ready access to the rich aquatic environments while, at the same time, protecting the residents from frequent flooding. The levee soils also were more productive agriculturally than the surrounding lower lying areas.

The levees support an array of arboreal and understory species; fruit (e.g., sugarberry, persimmon, hawthorn, and red mulberry) and nut (e.g., oak, hickory, and pecan) trees are concentrated on these landforms. In addition, the understory contains a variety of important subsistence (wild onion, pigweed, hog peanut, maypops, knotweed, palmetto, cat/green briar, brambles, elderberry, and grapes) and medicinal (horseweed, marshmallow, yaupon, touch-me-not, mayapple, spanish moss, and stinging nettle) plants.

Climate

The study area lies in a region characterized by a humid subtropical climate; long, hot, rainy summers and short, mild winters are common. The average growing season for Vermilion Parish is 271 days. The average summer temperature, recorded at Vermilion Lock, Louisiana, is 27.5° C (81.5° F), but temperatures have reached as high as 38° C (101° F) (Murphy and Libersat 1996). The winter months are relatively mild; average daily temperatures drop below 11° C (52° F) only during December, January, and February (Murphy and Libersat 1996).

Average precipitation measures 149.86 cm (59 in) annually. July ranks as the wettest month and it receive an average of 21.8 cm (8.59 in) of rainfall. October, the driest month, averages only 8.43 cm (3.32 in) of precipitation. Hurricanes and tropical storms represent the most dangerous weather threat to the area; they occur every few years during both the summer and fall.

CHAPTER III

PREHISTORIC CULTURAL SEQUENCE

Introduction

The Schooner Bayou project area lies entirely on the Coastal Plain and within a portion of Vermilion Parish, Louisiana. This parish is contained within Management Unit III, as defined by *Louisiana's Comprehensive Archaeological Plan* (Smith et al. 1983). This management unit is bordered to the west by the Sabine River and to the east by the Atchafalaya River, and it includes the sparsely settled prairies and coastal marshes of southern and southwestern Louisiana. The study area also lies within the Southeastern Cultural Area of the United States (Muller 1983). As a result, cultural characteristics found within the proposed project area resemble those manifested throughout the Lower Mississippi valley and along the northern coast of the Gulf of Mexico, as well as in other parts of the region.

The prehistory of Management Unit III extends from ca. 12,000 - 250 B.P. (10,000 B.C.- A.D. 1700) and it can be divided into four general archeological stages. These four stages (Paleo-Indian, Archaic, Woodland, and Mississippian) represent developmental periods characterized by patterns of subsistence and technology (Willey and Phillips 1958). Each stage consists of a sequence of chronologically defined periods that may be subdivided into phases based on sets of artifacts and other cultural traits characteristic of a particular geographic region (e.g., Jenkins 1979; Walthall 1980). This chapter will present a concise discussion of each of the cultural units to provide an overview of the prehistoric sequence of the current project area.

Paleo-Indian Stage (ca. 12,000 – 8,000 B.P. [10,050 – 6,050 B.C.])

Initial human occupation of the southeastern United States generally is believed to have occurred sometime between 10,000 and 12,000 years ago (12,000 - 10,000 B.P. [10,050 – 8,050 B.C.]). Paleo-Indian sites are characterized by a distinctive assemblage of lithic tools including fluted and unfluted lanceolate projectile points/knives, unifacial end and side scrapers, gravers, and spokeshaves.

The earliest Paleo-Indian culture identified in North America has been named "Clovis," after the type-site identified in the Southwest. In the western United States, Clovis sites appear to fall within a relatively narrow time range between 11,500 - 10,900 B.P. (9,950 – 8,950 B.C.) (Haynes 1991; Story et al. 1990:178). The smaller, fluted Folsom and unfluted Midland projectile points/knives once were thought to postdate Clovis times. Radiocarbon dating of numerous Folsom components in Texas, however, has produced dates ranging from ca. 11,000 - 10,000 B.P. (9,050 – 8,050 B.C.) (Largent et al. 1991:323-332; Story et al. 1990:189). This suggests that Folsom culture may be partially contemporaneous with Clovis culture.

Paleo-Indian peoples are thought to have been highly mobile hunter-gatherers, organized in small bands or extended family groups. The formerly prevalent notion that the Paleo-Indian populations were

represented by specialized big game hunters seems less tenable as information becomes available from a more inclusive set of Paleo-Indian sites. A possible exception to a generalized subsistence system could be the Folsom culture. For example, Folsom artifacts have been associated consistently with bison kill sites on the Great Plains. This culture may represent an adaptation to a specialized hunting strategy associated with the cyclical migration of large herds of bison (Story et al. 1990:189).

The presence of Paleo-Indian and Early Archaic peoples in southern Louisiana is best documented from Avery Island in Iberia Parish. The physiographic relief of the island apparently attracted both mammalian and human visitors to Avery Island throughout its history. As of 1983, *Louisiana's Comprehensive Archaeological Plan* documented only four Paleo-Indian sites within Management Unit III (Smith et al. 1983). While three of these sites were identified a substantial distance away from the current study area, the fourth, on Avery Island (Site 16IB3), demonstrates the presence of Late Paleo-Indian sites within the Coastal Zone, although restricted to a rather unique environment.

Archaic Stage (ca. 8,000 – 3,500 B.P. [6,050 – 1,550 B.C.])

The term "Archaic" first was developed in the second quarter of the twentieth century as a descriptor for the pre-ceramic cultures that followed the Paleo-Indian Stage. The Archaic Stage can be divided into three subdivisions or periods: Early Archaic, Middle Archaic, and Late Archaic. A warming trend and a drier climate at the end of the Pleistocene, accompanied by a rise in sea level, may have spurred a combination of technological and social developments that now are associated with the initiation of the Archaic Stage (Willey and Phillips 1958). Archaic populations exploited a greater variety of terrestrial and marine species than their Paleo-Indian predecessors.

Early Archaic Period

In the Southeast, the Early Archaic period begins ca. 10,000 – 8,000 B.P. (8,050 – 6,050 B.C.), but because of regional variations and the temporal overlapping of stages, the assignment of Late Paleo-Indian and Early Archaic period artifacts to correct temporal stages can be complex.

Throughout the Early Archaic, the subsistence pattern probably resembled that of the preceding Paleo-Indian Stage. Early Archaic peoples traveled seasonally in small groups between a series of base camps and extractive sites, hunting deer and collecting edible plants (Chapman and Shea 1981; Lentz 1986; Parmalee 1962; Parmalee et al. 1976). The majority of identified sites have been located in the uplands and Gulf Coastal Plain, but the extent to which the marshland environments of the Coastal Zone were utilized remains unknown.

Tools associated with food processing, including manos, milling stones, and nutting stones, first appear in Early Archaic period sites. Commonly utilized plant foods, such as walnuts, and hickory nuts could be hulled and eaten without cooking or additional processing (Larson 1980). Much of our knowledge regarding Paleo-Indian and Archaic lifeways is limited, therefore, by problems of preservation. Lithic tools often are the only artifacts to survive, but they provide only limited information about a narrow range of activities (i.e., the manufacture and maintenance of tools, the processing of meat and hides, and the working of wood and bone). In south-central Louisiana, Early Archaic period projectile points/knives have been recovered from Avery Island (16IB3) in Iberia Parish (Gagliano 1964:70), one of the parishes encompassed by Management Unit III.

Middle Archaic Period

During the Middle Archaic, three interrelated events occurred that helped shape the development of prehistoric cultures. First, the effects of continental glaciation subsided, resulting in a warmer and drier climate, with modern climatic and environmental conditions prevailing. Second, sociopolitical organizations changed in some areas; an increased number of ranked societies and related social developments appeared. Finally, technological improvements occurred, particularly with respect to groundstone, bone, and antler implements.

This period is typified by the Morrow Mountain horizon. Morrow Mountain projectile point/knife forms are distributed widely; they have been recovered from the eastern seaboard to as far west as Nevada, and from near the Gulf of Mexico to as far north as New England (Walthall 1980). Small to medium-sized, triangular projectile points/knives with short tapered stems characterize this horizon.

In Louisiana, the Middle Archaic is represented by projectile points/knives that include Morrow Mountain, Johnson, Edgewood, and possibly Calcasieu types (Campbell et al. 1990:96; Green 1991; Perino 1985:195). The possible utilization of the Coastal Zone during the Middle Archaic period is suggested by the occurrence of a Morrow Mountain I projectile point/knife (ca. 7,000 – 6,000 B.P. [5,050 – 4,050 B.C.]) from Avery Island (Gagliano 1964:71).

Late Archaic Period

The Late Archaic period represents a time of population growth, as demonstrated by an increasing number of sites found throughout the United States. Stone vessels made from steatite, occasional fiber tempered pottery, and groundstone artifacts characterize the period. Late Archaic projectile point/knife types found throughout Louisiana include corner-notched and stemmed forms.

In the eastern United States, the Late Archaic riverine economy focused on a few specific wild resources, including deer, mussels, fish, and nuts. During the spring, macrobands formed to exploit forested riverine areas, while during late fall and winter, Late Archaic peoples split into microbands and subsisted on harvested and stored nut foods and faunal species commonly found in the upland areas.

Archaic period sites typically are found along the boundary of Quaternary and Tertiary areas with relatively flat or undulating bluff tops that overlook the floodplains. Gibson (1976a:11) notes that most of the Archaic Stage sites in south-central Louisiana have been found on the old, elevated landforms of the Lafayette-Mississippi River system and near the lowlands. As of 1983, 40 Archaic period sites had been documented in Management Unit III (Smith et al. 1983); but only one of these was located in Vermilion Parish. The Banana Bayou Site (16IB104), produced a radiocarbon date calibrated at ca. 5,850 – 4,805 B.P. (3,900 – 2,855 B.C.) (Gibson and Shenkel 1988). This suggests that land forms associated with the Teche delta complex may be old enough to contain Late Archaic period deposits.

Poverty Point Culture (ca. 4,000 – 2,500 B.P. [2,050 - 550 B.C.])

Poverty Point represents a transitional culture that originated ca. 4,000 B.P. (2,050 B.C.), but it did not realize its full potential until much later. As a result, the Poverty Point sphere of influence may not have arrived in the coastal region of south-central Louisiana until ca. 3,450 B.P. (1,500 B.C.) (Gibson 1979, 1994; Neuman 1984). The culture is best represented at the type site (16WC5) in northeast Louisiana. Poverty Point is best known for exhibiting several fundamental and distinguishing characteristics of a

complex society, i.e., massive public architecture and long-distance trade, while maintaining a hunting and foraging economy (Jackson 1991).

The material culture of Poverty Point society was distinctive. Materials associated with Poverty Point culture include atlatl weights, plummets, beads and pendants, thin micro flints/blades, clay cooking balls, clay figurines/fetishes, and food storage and preparation containers. Container types included steatite vessels, basketry, and untempered ceramic materials. Most ceramic vessels were sand tempered, although a minority of grit tempered, clay tempered, fiber tempered ceramics, and untempered sherds and vessels have been recovered. Webb (1982) reported the recovery of seed processing implements, stone hoe blades, nutting stones, and milling stones. Earthen ovens also have been identified.

Possible Poverty Point sites identified in the Coastal Zone of south-central Louisiana consist of camps on Avery Island and Belle Isle (Gagliano 1964:98; Gibson et al. 1978:33-34). While Poverty Point shell midden sites in southeast Louisiana suggest seasonal and specialized adaptations to marsh environments, the dearth of similar sites in south-central Louisiana is suggested by Gibson et al. (1978) to represent a period in which the LaFourche deltaic complex was subsiding. *Louisiana's Comprehensive Archaeological Plan* lists only 15 Poverty Point sites in Management Unit III (Smith et al. 1983). None of these were located within Vermilion Parish.

Woodland Stage (ca. 2,450 - 750 B.P. [500 B.C.- A.D. 1200])

The Woodland Stage in Louisiana is characterized by a combination of horticulture, the introduction of the bow and arrow, and the widespread use of ceramics. The Woodland Stage is subdivided into three periods: Early, Middle, and Late. In south-central Louisiana, i.e., in the coastal region of the state, the Early Woodland period (ca. 2,450 – 1,949 B.P. [500 B.C.- A.D. 1]) is represented by the Tchefuncte culture; the Middle Woodland period (ca. 1,949 – 1,550 B.P. [A.D. 1 - 400]) is associated with Marksville culture and, to a lesser extent, with the Troyville culture; the Late Woodland period (ca. 1,550 - 750 B.P. [A.D. 400 - 1200]) originated with the Troyville culture but was dominated by Coles Creek culture.

Tchefuncte Culture (ca. 2,450 – 1,949 B.P. [500 B.C. - A.D. 1])

Tchefuncte culture is characterized by the first widespread use of pottery, although within the context of a Late Archaic-like hunting and gathering tradition that utilized a Late Archaic-like tool inventory (Byrd 1994; Neuman 1984; Shenkel 1981:23). Tchefuncte ceramics usually are characterized by their soft, chalky paste, and laminated appearance (Phillips 1970). Vessel forms consisted of bowls, cylindrical and shouldered jars, and globular pots that sometimes exhibit podal supports. Many vessels are plain; however, some are decorated with punctations, incisions, simple stamping, drag and jab, and rocker stamping. During the later portions of this period, red filming also was used to decorate some vessels (Perrault and Weinstein 1994:46-47; Phillips 1970; Speaker et al. 1986:38).

For the most part, the stone and bone tool sub-assemblages remained nearly unchanged from the preceding Poverty Point culture. Stone tools utilized by these people included boat stones, grooved plummets, chipped celts, and sandstone saws; bone tools included awls, fishhooks, socketed antler points, and ornaments. In addition, some tools such as chisels, containers, punches, and ornamental artifacts were manufactured from shell. Bone and antler artifacts, such as points, hooks, awls, and handles, also became increasingly common during this period.

Tchefuncte sites generally are classified either as coastal middens, or as inland villages or hamlets. Settlement usually occurred along the slack water environments of slow, secondary streams that

drained bottomlands, floodplain lakes, and littoral zones (Neuman 1984; Toth 1988:21-23). Shell midden sites and their associated faunal remains are well known for Tchefuncte culture and they document the wide variety of food resources utilized during this period. From southwest and south-central Louisiana, Tchefuncte burials and artifacts suggest an egalitarian social organization. Social organization probably remained focused within macrobands, and hunting, gathering, and fishing remained integral to the Tchefuncte lifestyle.

As of 1983, the original publication date for *Louisiana's Comprehensive Archaeological Plan*, 37 Tchefuncte period sites or components had been documented in Management Unit III (Smith et al. 1983); four of these are located within Vermilion Parish. None of these sites, however, are located within the vicinity of the current study area.

Marksville Culture (ca. 1,949 – 1,550 B.P. [A.D. 1 - 400])

Marksville culture often is viewed as a localized version of the elaborate midwestern Hopewell culture, which filtered down the Mississippi River from Illinois (Toth 1988:29-73). A more highly organized social structure than their Tchefuncte predecessors is implied by the complex geometric earthworks, conical burial mounds used for burying the elite, and the unique mortuary ritual systems that characterize Marksville culture. Some items, such as elaborately decorated ceramics, were manufactured primarily for inclusion in burials. Burial items associated with this culture include pearl beads, carved stone effigy pipes, copper ear spools, copper tubes, galena beads, and carved coal objects. Toward the end of the Marksville period, however, Hopewellian influences declined, and mortuary practices became less complex (Smith et al. 1983; Speaker et al. 1986).

Ceramic decorative motifs such as decorating with cross-hatching, U-shaped incised lines, zoned dentate rocker stamping, cord-wrapped stick impressions, stylized birds, and bisected circles were shared by both the Marksville and Hopewell cultures (Toth 1988:45-50). Additional Marksville traits include a chipped stone assemblage of knives, scrapers, celts, drills, ground stone atlatl weights and plummets, bone awls and fishhooks, baked clay balls, and medium to large stemmed projectile points dominated by the Gary type.

A variety of exotic artifacts commonly found at Marksville sites suggests extensive trade networks and the development of a ranked, non-egalitarian society. Some of the more commonly recovered exotic items include imported copper earspools, panpipes, platform pipes, figurines, and beads (Neuman 1984; Toth 1988:50-73). The utilitarian material culture remained essentially unchanged, reflecting an overall continuity in subsistence systems (Toth 1988:211). Marksville peoples probably used a hunting, fishing, and gathering subsistence strategy much like those associated with earlier periods. Gagliano (1979) suggests that food procurement activities were a cyclical/seasonal (transhumance) activity that revolved around two or more shifting camps.

Recent investigations in Terrebonne and St. Mary Parishes have identified additional Marksville period sites, including mound sites, hamlets, and shell middens (Weinstein and Kelly 1989). Weinstein and Kelley (1989:294-295) concluded, from reviewing the Marksville period ceramics recovered from the identified sites in the region, that the early through late Marksville periods were represented. As of 1983, the original publication date for *Louisiana's Comprehensive Archaeological Plan*, 38 Marksville sites had been documented in Management Unit III (Smith et al. 1983); only seven of these sites have been identified within Vermilion Parish.

Troyville-Coles Creek Period (ca. 1,550 - 750 B.P. [A.D. 400 - 1200])

Troyville culture, called Baytown elsewhere, represented a transition from the Middle to Late Woodland period that culminated in Coles Creek culture (Gibson 1984). Though distinct, these two cultures are sufficiently similar that many researchers group them as a single prehistoric cultural unit. The continuing developments of agriculture and the refinement of the bow and arrow during this time, radically altered subsequent prehistoric lifeways. During the Troyville cultural period, bean and squash agriculture may have became widespread based on the appearance of large ceramic vessels. This shift in subsistence practices probably fostered the development of more complex settlement patterns and increased social organization.

The Late Woodland Coles Creek culture emerged from Troyville around 1,200 B.P. (A.D. 750) and represented an era of considerable economic and social change in the Lower Mississippi Valley. By the end of the Coles Creek period, communities became larger and more socially and politically complex, large-scale mound construction occurred, and there is evidence for the resumption of long-distance trade on a scale not seen since Poverty Point times (Muller 1983). These changes probably initiated the transformation of Coles Creek cultural traits into what is now recognized as Plaquemine culture sometime before 750 years ago (A.D. 1200) (Jeter et al. 1989; Williams and Brain 1983).

Ceramics of this period are distinguished by their grog and grog/sand tempers, as opposed to the chalky, sand tempered paste characteristics of previous ceramic series. Sites dating from the Coles Creek cultural period primarily were situated along stream systems where soil composition and fertility were favorable for agriculture. Natural levees, particularly those situated along old cutoffs and inactive channels, appear to have been the most desirable locations (Neuman 1984). Most of the larger Coles Creek sites, usually located in more inland areas, typically contain one or more mounds.

Along the Louisiana Coastal Zone, agriculture probably represented a minor, if not non-existent, portion of the subsistence pattern during the Troyville-Coles Creek period. Gibson et al. (1978:41) note that tidal fluctuations, saline conditions, and restricted quantities of elevated ground on which to grow crops preclude substantial cultivation in the Coastal Zone. *Louisiana's Comprehensive Archaeological Plan* documents 196 sites with Troyville-Coles Creek components within Management Unit III (Smith et al. 1983). Of these 196 sites, 11.7 percent (n= 23) are located within Vermilion Parish.

Mississippian Stage (ca. 750 - 300 B.P. [A.D. 1200 - 1700])

The Mississippian Stage represents a cultural climax in population growth and social and political organization for those cultures occupying the southeastern United States (Phillips 1970; Williams and Brain 1983). Formalized site plans consisting of large sub-structure "temple mounds" and plazas have been noted throughout the Southeast (Hudson 1978; Knight 1984; Williams and Brain 1983; Walthall 1980). The Mississippian Stage in southern Louisiana contains two subdivisions: the Plaquemine or Emergent Mississippian period (750 - 500 B.P. [A.D. 1200 - 1450]) and the Late Mississippian period (500 - 250 B.P. [1450 - 1700]). Late Mississippian culture is found only in limited parts of the coastal zone of south-central Louisiana and it may never have reached southwest Louisiana (Brown 1981; Brown and Brown 1978; Jeter et al. 1989). In the current study area, the Plaquemine culture may have lasted until after the period of European contact (200 B.P. [A.D. 1750]) (Gibson 1976a, 1976b; Jeter et al. 1989).

Emergent Mississippian Period (ca. 750 - 500 B.P. [A.D. 1200 - 1450])

The Emergent Mississippian period - Plaquemine culture represents a transitional phase from the Coles Creek culture to a pure Mississippian culture (Kidder 1988). Plaquemine peoples continued the settlement patterns, economic organization, and religious practices established during the Coles Creek period; however, sociopolitical structure, and religious ceremonialism intensified, suggesting a complex social hierarchy. Large sites typically are characterized as ceremonial sites, with multiple mounds surrounding a central plaza. Smaller dispersed villages and hamlets also formed part of the settlement hierarchy (Neuman 1984).

Although Plaquemine ceramics are derived from the Coles Creek tradition, they display distinctive features that mark the emergence of a new cultural tradition. In addition to incising and punctating pottery, Plaquemine craftsmen also brushed and engraved vessels (Phillips 1970). By ca. 500 B.P. (A.D. 1450), the Plaquemine culture in much of the Lower Mississippi Valley apparently had evolved into a true Mississippian culture (Kidder 1988:75).

Plaquemine sites rarely are recorded in south central Louisiana. Those identified along Bayou Teche, the Vermilion River, and the Lower Atchafalaya Basin do not exhibit the cultural traits found in the Lower Mississippi Valley and Lower Red River Valley (Gibson 1976a:20; Gibson et al. 1978:44). Most sites are reported to be shell middens or small villages described as less elaborate than the inland Plaquemine sites. Rectangular mound sites with centralized plazas are not altogether unknown in the region, but occur less frequently than in other areas (Gibson 1976a:20). In addition to shell middens and villages, specialized sites also have been identified. The Salt Mine Valley Site (16IB23) situated on Avery Island is one such specialized site. Prehistoric salt production in the United States gained importance primarily during the Mississippian period, post ca. A.D. 900 (Brown 1981:1).

Coastal Plaquemine in south-central Louisiana, unlike groups located further inland and to the east, possibly remained unchanged until ca. A.D. 1750, according to ethnographic accounts. *Louisiana's Comprehensive Archaeological Plan* documents 83 Plaquemine cultural period sites in Management Unit III (Smith et al. 1983). Of the 83 Plaquemine sites in Management Unit III, 16 are located with Vermilion Parish.

Late Mississippian Period (ca. 500 - 250 B.P. [A.D. 1450 - 1700])

During this time, several traits that are characteristic of the Mississippian period were widespread across most of the Southeast. These diagnostic traits included the construction of well-designed mound groups, a wide distribution of sites and trade networks, shell tempered ceramics, and a revival in the ceremonial burial of the dead (Griffin 1990:7-9). Mississippian subsistence was based on the cultivation of maize, beans, squash, and pumpkins; the collection of local plants, nuts, and seeds; and fishing and hunting of local species. A typical Mississippian settlement consisted of an orderly arrangement of village houses, surrounding a truncated pyramidal mound. These mounds served as platforms for temples or as houses for the elite.

Ceramic types frequently are characterized by shell tempering, an innovation that enabled potters to create larger vessels (Brain 1971; Steponaitis 1983). Ceramic vessels included such forms as globular jars, plates, bottles, pots, and salt pans. The loop handle appears on many Mississippian vessels. Although utilitarian plainware was common, decorative techniques include engraving, negative painting, and incising; modeled animal heads and anthropomorphic images adorned the ceramic vessels. Other Mississippian artifacts include chipped and groundstone tools; shell items such as hairpins, beads, and gorgets; and mica

and copper items. Chipped and ground stone tools and projectile point styles such as Alba and Bassett also were common.

In south-central Louisiana, the Late Mississippian period is less clearly defined than in other areas of the state. As previously stated, some continuity may have existed between earlier Plaquemine occupations and later occupations in the region. Recent investigations tend to support the position that Plaquemine culture dominated the region during the Mississippian period. Evidence of this results from research in the Terrebonne Marsh in south-central Louisiana, which found that shell tempered "Mississippian" ceramic wares were in the minority, while Plaquemine ceramics were represented heavily at most sites in the area (Weinstein and Kelley 1992:378).

Although the sites probably were under-reported, the original version of *Louisiana's Comprehensive Archaeological Plan* documented 17 Mississippian cultural period sites/components in Management Unit III, including three that were identified within Vermilion Parish (Smith et al. 1983). While not reported, hybrid Mississippian like artifacts may be found in association with Plaquemine, Attakapan, or Chitimacha sites that date from either the protohistoric or early historic cultural periods.

Protohistoric and Early Historic Period (ca. 411 - 220 B.P. [A.D. 1539 - 1730])

An understanding of protohistoric and historic Native American cultures of the southeastern United States is limited severely by the frequent inability to recognize the ancestral cultures from which these historic groups were derived. This is due partially to the waning influence of Mississippian and, to a lesser degree, Plaquemine culture, but primarily it is a result of the social disruption initiated by the legacy of the Hernando de Soto entrada of 1539 -1543, and the subsequent French and Spanish exploration and colonization of the Southeast. Native American population upheavals and depletions were related to warfare, disruptive migrations, and epidemics introduced by European contact (Davis 1984; Smith 1977). Villages apparently remained similar to those observed previously at Plaquemine and Mississippian sites. The larger villages generally featured one or more truncated pyramidal mounds surmounted by chiefs' houses and temples; the remaining villagers lived in the area surrounding the mounds and in satellite hamlets. Houses were rectangular in shape and were constructed of poles placed in the ground, with wattle and daub walls, and thatched roofs (Swanton 1946). The French learned cultivation techniques for corn, squash, potatoes, tobacco, and other indigenous crops from the Chitimacha and the French apparently lived in those Native American communities during times of famine.

Gibson (1976a:21) states that early colonists arriving in the region "found the Plaquemine culture still flourishing" in the 1700s. These inhabitants may have been the Vermilion band of the Attakapa tribe and the Chitimacha tribe. They also identify the Chitimacha occupying areas along lower Bayou Teche, Grand Lake, and the Atchafalaya River.

The Attakapa originated in southeast Texas, but, following varying degrees of interaction began migrating to southwest Louisiana during the Late Prehistoric Period. Swanton (1953:197-199) recounts that the easternmost Attakapa resided on the Mermentau River and near Vermilion Bay. In 1760, the Attakapa sold the land located between Bayou Teche and the Vermilion River, where their village was located, to a French settler, Fusilier de la Clair (Swanton 1946). The village, however, continued to be occupied by the band until the early nineteenth century.

The Chitimacha originally were located on Bayou Lafourche, Grand Lake, and the lower portion of Bayou Teche (Kniffen et al. 1987:53; Swanton 1946:119, 1953:202-204). In 1702, Louis Antoine Juchereau de St. Denis took members of the Chitimacha tribe as slaves, but was immediately ordered to return them to their people by Jean Baptiste le Moyne, Sieur de Bienville. In 1706, the alliance was broken

when the Chitimacha attacked and killed four Frenchmen in retaliation for an attack carried out by the Teansas earlier that same year. For the next 12 years, the Chitimacha fought the French and their Native American allies. In 1718, peace terms were stipulated and agreed upon, resulting in the Chitimacha relocating to the Mississippi River near the present-day town of Plaquemine. Within a short period, however, the Chitimacha, once the strongest and most "cultured" of the south Louisiana tribes, were reduced in numbers and joined the Attakapa and Houma. Only a few Chitimacha remained by 1881 and those were on a reservation located near the town of Charenton (Kniffen et al. 1987:75).

CHAPTER IV

HISTORIC OVERVIEW

Introduction

The following historical overview identifies the cultural processes that contributed to the historical development of the area. Comparisons of the French, Spanish, and American patterns of colonization, and discussions pertaining to the ethic groups that migrated to the area are provided to clarify historic land use patterns throughout the general area.

The Colonial Period

During the French and Spanish colonial periods, the study area was included in that part of the Louisiana colony known as the Attakapas region, so-named for the Native American tribes indigenous to the area. French trappers and concessionaires were joined in the Attakapas region by the Acadians, many from the Chignecto Isthmus of Nova Scotia, and Malagans, emigrants from the Costa del Sol in southern Spain. By the end of the Spanish regime, Bayou Teche, upper Bayou Sale, and the Vermilion River were lined with land claims (Bergerie 1962:3-11; Brasseaux 1987:91-98, 122; Davis 1971:131; Vermilion Historical Society 1983:7-9).

French Colonial Period

Nearly 140 years following the last of the unsuccessful sixteenth century Spanish expeditions through the Louisiana region, the French began their exploration of the lower Mississippi River. On April 9, 1682, Réné Robert Cavelier, Sieur de la Salle, claimed all lands drained by the Mississippi River for Louis XIV, King of France. Approximately, sixteen years later, in 1698-1699, Pierre le Moyne, Sieur d'Iberville, led an expedition to explore the lower "Colbert or Mississippi River, from its mouth to the Natchez Nation," and to "establish a colony in Louisiana" (French 1875:29, 31).

Shortly after the founding of the Louisiana colony in 1699, the French began to establish permanent settlements along the Mississippi River and the Gulf Coast; however, the French Government discouraged colonization of southwestern Louisiana. Additionally, settlers were reluctant to leave the security of the Mississippi River posts for "the west," as the territory then was called by the French colonists. Still, Spanish missionaries reported secluded groups of colonists throughout the Attakapas as early as 1713. The Native Americans of the Attakapas-Opelousas region initiated trade with the colonial government, offering pelts, tallow, and horses in exchange for French goods. By the 1740s, a profitable deerskin and fur trade had been established with the "Attakapas Country," whose name had replaced "the west" as the common designation for southwestern Louisiana (Bergerie 1962:3; De Ville 1973:24-31, 1986:4; Fontenot and Freeland 1976:1; Iberia Parish Development Board ca. 1949:12).

By the mid-eighteenth century, the French discovered that the southwestern Louisiana prairies were well suited for tobacco cultivation and for cattle ranging (De Ville 1973:31-33). Edouard Masse, one of the earliest documented settlers in the area of present-day St. Martinville, probably arrived during the 1740s. Masse owned 20 slaves, possessed a partnership in a cattle ranch, and lived in crude frontier conditions:

> [He] lived in an open shack, slept on bearskin stretched on boards, and dressed in deer skins. His only utensils were a knife and horn, both of which he carried with him. He lived this way for nearly twenty years, extending hospitality to anyone asking for it; but there were few comforts to induce any travelers to linger there (Bergerie 1962:4).

In 1760, Masse and his partner, retired military officer Antoine Bernard Dauterive, were granted an Attakapas concession upon which they established a cattle ranch, or *vacherie*. This grant was located on the east side of Bayou Teche near the present-day site of Loreauville. The Dauterive-Masse concession later became the site of the first Acadian settlement in the region, *Fausse Pointe* (Brasseaux 1987:75, 91-92).

The French government proposed a military post in the Attakapas country as part of its plan to protect and secure the boundaries of the developing Louisiana colony. The *Poste des Opelousas* was established under the command of Louis Pellerin in 1763, shortly before western Louisiana was transferred officially to Spain. The Opelousas Post, situated in the vicinity of modern-day Port Barre (i.e., in St. Landry Parish), apparently was referred to as Attakapas, in reference to the region that it served; however, the use of the name was discontinued with the establishment of the *Poste des Attakapas* at present-day St. Martinville (Brasseaux 1987:94; De Ville 1973:32-34; Fontenot and Freeland 1976:19; Pittman 1973:36).

Spanish Colonial Period

On November 3, 1762, under terms of the Treaty of Fontainebleau, France secretly ceded the Isle of Orleans and all of the Louisiana colony west of the Mississippi River to Spain. Not only did France rid itself of the heavy financial burden of administering and supporting the colony, but the transfer also prevented a sizeable portion of the territory from falling under British control as a result of the impending English victory in the French and Indian War. Although the transfer was announced publicly in 1764, it was not until 1769 that the French colonial government finally was abolished and Spanish control was established under the governorship of Alejandro O'Reilly (Chambers 1898:48; Davis 1971:69-70, 97-105).

The Acadians

During the transitional period from French to Spanish rule, small groups of Acadians arrived in Louisiana and they were sent by the French government in New Orleans to the Attakapas and Opelousas regions. The Spanish Attakapas District extended "along the sea coast between the Delta of the Mississippi and the Western boundary" (the Sabine River), while the Opelousas District adjoined Attakapas to the north (Sibley 1806:97). Several Acadian settlements were established ca. 1765-1766 in these southwestern districts. First and southernmost, in the present-day Loreauville area, was *Fausse Pointe*, originally called "*le dernier camp d'en bas*" (roughly, "the last camp of the lower side"). To the northwest, along Bayou Teche between present-day Parks and the original site of the Opelousas Post, were *La Pointe de Repos*, *La Manque*, and *Prairie des Coteaux*. *Côte Gelée* was established on the west bank of Bayou Tortue, to the west of the *Fausse Pointe* and *La Pointe* settlements. All of these early Acadian communities lay north of the study area, but their establishment was paramount to the development of the region (Brasseaux 1987:93-95).

The census of April 25, 1766, listed an estimated 150 inhabitants of the district: 16 households at the "District of the Pointe" (*Fausse Pointe*), 17 households on Bayou Tortue (*Côte Gelée*), 14 households at *La Manque* (probably positioned between present-day Breaux Bridge and Parks), and two households under the category "Allibamont Established at the Attakapas" (the "*Allibamont*," or *Alabamons*, were French nationals who left Fort Mobile in 1763 to escape British rule). This last "Allibamont" entry included Edouard Masse's 20 slaves, who, incidentally, were the only slaves recorded in the Attakapas District; the other 130 inhabitants were described as white settlers (Brasseaux 1987:94; Taylor 1980:16 fn.14; Voorhies 1973:124-125).

By 1774, the general census of the Attakapas region (October 30, 1774) listed 129 white adults and 194 white children, 12 free black adults and 6 free black children. In addition, 155 slaves were counted. The white inhabitants owned 5,208 head of cattle, 701 horses and mules, 1,126 pigs, and 96 sheep. The free blacks owned 87 head of cattle, 33 horses and mules, and 45 pigs (Voorhies 1973:280-283).

As Acadian pioneers ventured up Bayou Teche in 1766, they established communities. A group of 44 Acadians settled at La Manque, just below present day Breaux Bridge. That same year, a second group of Acadian refugees advanced westward towards the Vermilion River. They settled at *Cote Gelee* on the western bank of Bayou Tortue, which, as the name implies, winds a tortuous course between Bayou Teche and the Vermilion River. *Cote Gelee* was located between the present day communities of Pilette and Broussard. The upper portion of the Vermilion River, however, discouraged settlement because its low banks had a tendency to flood. The lower Vermilion River proved to be much more popular. The settlers of *Cote Gelee* soon abandoned the site on Bayou Teche and relocated to the lower Vermilion River.

Many of the Acadians moved westward from their settlements along Bayou Teche to the Vermilion River. By 1777, approximately 12 families had migrated west to settle just north of present-day Lafayette. During the next year, an additional 18 or so Acadians settled farther south, between present-day Lafayette and Abbeville; however, settlement beyond the flood plain of the Vermilion River proceeded slowly since timber supplies in those areas were not adequate enough to sustain a settlement. Marin Mouton's land claim, situated on the western prairie of the lower Vermilion River, was the exception to this pattern (Brasseaux 1987:95-99).

A smaller southeastward migration of Acadians also occurred during the late 1770s, as Acadian families moved to the vicinity of present-day Jeanerette in Iberia Parish. Due to the animosity exhibited by the local Creoles, though, several of the Acadian settlers of the *Chicot Noir* community moved westward in 1782 to join their countrymen along the central and lower Vermilion River (Brasseaux 1987:96).

In the late eighteenth century, the Acadians of southwestern Louisiana concentrated on raising cattle rather than growing crops. Their agricultural efforts were intended for subsistence and home consumption rather than for commercial gain. As the ranchers raised more cattle they produced less corn, vegetables, and cotton (Brasseaux 1987: 125).

Acadian settlers in the prairies did not adopt slaveholding as quickly as their Acadian counterparts settled along the Mississippi River. Nevertheless, by 1785, about 10 percent of the Acadians in southwestern Louisiana held slaves. The number of slaveholders increased until 1810, when more than half of the Acadian families in the prairies owned bondsmen (Brasseaux 1987:192-197).

Land Claims within Vermilion Parish

In the area that forms present-day Vermilion Parish, land claims were clustered primarily along the Vermilion River. Some members of the Broussard family, descendants of one of the eight Acadian "Chieftains," had settled along the upper Vermilion River. On the lower Vermilion, most of the land grants were held by Americans and French and English nationals. One large tract positioned near the mouth of the Vermilion River was composed of grants made to a New Orleans family -- John Baptiste McCarty, his daughter, and two sons. Land use throughout the region included harvesting timber, cattle grazing, and farming. The Spanish colonial government apparently began granting land claims along the lower Vermilion River ca. 1780 (Vermilion Historical Society 1983:7-9).

In Vermilion Parish, the project area includes or borders land tracts originally claimed by Marin Mouton, John and Jesse White, Louis Delahoussaye, Pierre and Antoine Etier, and Catherine Bondin, the Widow Etier. One of these claimants, Marin Mouton, came from St. James Parish, where he was born in 1758. According to the militia rolls, Mouton lived within the Attakapas region by 1777, and by the early 1790s, he occupied the office of syndic (comparable to a Justice of the Peace) (Vermilion Historical Society 1983:234-235).

Mouton claimed 1,720 ha (4,251 ac) in Township 13S, Range 3E, on the western prairie of the Vermilion River, which he purchased from the Attakapas Chief Bernard Medal in 1802. Witnesses who validated his claim testified that eight families had settled and made numerous improvements to the land: ". . . in a few months after going to work on the place, there were comfortable and necessary buildings erected, and a field enclosed with cypress pens; and that place has been cultivated from that time to the present [1811]" (Lowrie and Franklin 1834:3:143-144).

Depositions taken in support of Mouton's claim detailed the nature of the settlement, which apparently consisted of related households. It was typical of the Acadian settlers in the Attakapas to form communities of related families:

> Michel Prevots [Prevost] . . . ["]hath deposed, that, twelve or thirteen years ago [ca.1800], the claimant settled on the land claimed, and has established the following persons on different parts of the same tract, to wit, Francois Hebert, having a wife and three children, Charles Boudoin, having a wife and one child, Marin Mouton, son of the claimant, having a wife and one child, the wives of Hebert and Boudoin, being the daughters of the claimant. That several other persons are also established on the tract of land in question, on separate portions sold and allotted to them by the said Marin, to wit, Pierre Boudin, having at present a wife and four children, Alphonso Boudoin, having, at present date, a wife and two children, Ambrose Stoots, having now a wife and two children, the widow of Andrew Lemaire, having five children; that Francois Hebert was established on the land at the same time of the original claimant; that the other persons have been subsequently established thereon, some of them about seven years. . . . The deponent further saith that he has always understood, and has reason to believe, that the said Marin Mouton made the purchase of this large tract of land at the request of some of the present proprietors, and with a view to form a compact settlement or neighborhood of persons, most of whom were connected in their families with each other" (Lowrie and Franklin 1834:3:143-144).

The area settled by Mouton presently is called Mouton Cove (Vermilion Historical Society 1983:15).

Territorial and Antebellum Eras

As part of the negotiations leading to the 1803 Louisiana Purchase, Spain restored western Louisiana to France, which shortly thereafter conveyed the Louisiana Territory to the United States. On March 26, 1804, that portion of the Louisiana Purchase located below the thirty-third parallel was designated the Territory of Orleans. The following year, Orleans was partitioned into 12 counties, including the county of Attakapas, which encompassed the present-day parishes of Iberia, St. Mary, and Vermilion, most of Lafayette and St. Martin Parishes, and portions of Cameron and Iberville Parishes. In 1807, the territorial legislature reorganized the county system, further dividing the Territory of Orleans into 19 parishes. Attakapas County was superseded by the parish of St. Martin, which encompassed roughly the same territory as its predecessor. Originally (1807 - 1811), St. Martin Parish was bounded to the northwest by St. Landry Parish, to the southeast by La Fourche [sic] Parish, to the south by the Gulf of Mexico, and to the northeast by the western Mississippi River parishes of Baton Rouge, Iberville, Ascension, and Assumption. In 1811, southeastern St. Martin Parish was re-designated St. Mary Parish, which included Marsh Island and part of what later would become southern Iberia Parish. The following year, on April 30, 1812, the State of Louisiana was admitted to the Union (Bergerie 1962:14-15; Davis 1971:157-164, 167-169, 176; Goins and Caldwell 1995:41-42).

As a result of the Louisiana Purchase (1803), many changes occurred with the general area. The transition from Spanish to American ownership brought accelerated population growth and an increasingly diversified population. Americans eager to exploit the resources of the region migrated to southwestern Louisiana. The new immigrants preferred agriculture to cattle raising. By 1830, cotton and sugar cane cultivation replaced ranching as one of the chief rural enterprises.

After the Louisiana Purchase, southwestern Louisiana underwent marked changes in terms of its political boundaries. The project area was encompassed by the newly created Attakapas County in 1805. Under the county government, such Anglo-American institutions such as jury trial, the English language, and the common law were introduced. Since the established inhabitants disliked these innovations, the legislative council soon replaced the county system with parish government. By this system, the territorial governor appointed a parish judge who held and exercised the combined powers of judge, county clerk, sheriff, coroner, and treasurer. With the justice of the peace and a jury of 12 inhabitants he made policy and administrative decisions affecting police, taxation, and public works.

In 1807, Attakapas Parish was renamed St. Martin Parish. Subsequent changes included the creation of Lafayette Parish in 1823 from the western part of St. Martin Parish. Its territory included present day Lafayette and Vermilion Parishes. A legislative act in 1844 excised the southwestern portion of Lafayette Parish to create Vermilion Parish (Griffin 1959:22-23).

Bayou Teche served as the primary route to the project region after the Louisiana Purchase. The Vermilion River emerged as a secondary route. Snags, however, made navigation on the Teche above New Iberia and along the entire route of the Vermilion difficult (Prichard et al. 1945: 823-824).

Barges continued to provide the chief means of transportation by water from the vicinity of the project area to the outside world. While moving downstream, crews used poles to guide the vessel as it drifted with the current. To move upstream, even on the sluggish Bayou Teche, a barge had to be drawn by ropes tied to slaves or horses walking along the shore. Travel was dangerous and only undertaken during the day.

The overall project area was hampered by the lack of rail transportation during the antebellum period. In 1850, the New Orleans, Opelousas, and Great Western Railroad completed its tracks from New Orleans to what is now Morgan City (then called Brashear City). Plans called for the line to continue

through New Iberia to Vermilionville (Lafayette). While some track had been laid, the line remained inoperable to the west of Morgan City (Griffin 1959: 86-88).

As a substitute for rail support, the company dispatched the steamboats from Morgan City to carry freight and passengers up Bayou Teche and environs. This important service was terminated during the Civil War with the Federal invasion. In 1862, United States troops seized the railroad's auxiliary fleet. The Federal Navy thereafter used the vessels for military purposes (Griffin 1959: 86-88).

Cattle raising continued to prosper in southwestern Louisiana through the first quarter of the nineteenth century. By 1827, cattle had registered more than 40 brands and identifying marks for livestock grazing in Lafayette Parish alone. Nevertheless, after 1830, ranching declined in relative economic importance; the prairie grasslands along the Vermilion River were plowed up and replaced with cotton and sugar cane. Few communities of any consequence were located in the immediate vicinity of the project area during the pre-Civil War era. Erath dates from the postbellum period (Pourciau 1985:144). Broussard, then known as Cote Gelee, consisted of a post office, some stores, and a few members of the Broussard, Bernard, Melancon, and Landry families (Edmonds 1979: 74). The town of Youngsville, originally called Royville, had its beginnings in 1831 when J.J. Roy took up land there. The town was laid out in 1839, members of the Roy, Landry, Dyer, and Young families settled the area. Population levels however, remained minuscule before the Civil War (Griffin 1959: 73-74).

By 1840, the community of Point Breaux contained a variety of enterprises. These included: general merchandise, hardware, and dry goods stores; millinery and apothecary shops; blacksmiths; and a baker. The town even had a few board sidewalks. The legislature of Louisiana incorporated Pont Breaux or Breaux Bridge in 1859 (Pourciau 1985: 17).

In 1843, the town of Abbeville was founded by Father Antoine Desire Megret, a French born Capuchin missionary. He purchased $900.00 worth of land from Joseph Leblanc and built St. Mary Magdalen Church in what is presently downtown Abbeville. In 1854, the town became the parish seat of Vermilion Parish (Vermilion Historical Society 1983).

Development of Sugar Plantations

Agriculture throughout the Attakapas, especially along the waterways, emerged as a dominant industry. The economy relied on cane and cotton agriculture and in 1835, sugar cane surpassed cotton as the major cash crop for the region. The attraction of cane cultivation was enhanced after Etienne de Boré discovered a method of processing Louisiana cane into sugar (1796). Throughout Louisiana, planters scrambled to find new cash crops as indigo succumbed to crop disease. As long as it was protected by high tariffs, Louisiana sugar competed favorably within the domestic market. Throughout the antebellum era, sugar cultivation and processing dominated the south Louisiana economy; by 1850, approximately 1,500 sugar plantations were scattered throughout Louisiana (Kniffen and Hilliard 1988:136-137; Wall et al. 1984:156).

The substitution of sugar cane for cotton as a staple crop was facilitated by the protection accorded to domestic sugar by the Tariff of 1816 and the falling prices of cotton after the Panic of 1819. In the Attakapas region, the shift to sugar cane advanced briskly (Degelos 1892:65-68).

Before 1850, the majority of sugar planters were busy expanding and developing their holdings. Using borrowed capital, they purchased new lands and acquired plantations, slaves, and equipment (Sitterson 1953:70). By the 1850s, though, the developmental phase had ended. The sugar plantation

regime was firmly established, dominating the economy of those Louisiana parishes situated below the Red River.

During the antebellum era, sugar planters did not utilize centrally located mills or refineries. Every sugar cane plantation had to be both farm and factory, necessitating a sugarhouse for each plantation, regardless of size (Roland 1957:3). The capital outlay required for machinery made sugar production far more expensive than the production of cotton, which situation, of course, gave the large planter with available capital an advantage over his less affluent competitors. As a result, large plantations exercised a significant economic influence on the sugar industry.

Every prominent waterway in the project region supported sugar plantations. The lower Vermilion River, Bayou Cypremort, and Bayou Sale were no exceptions; however, the most significant waterway in the lower Attakapas in terms of sugar cultivation was Bayou Teche. Sugar plantations developed all along the Teche, including many in the northeastern portion of the study area through St. Mary and Iberia Parishes. The average price of land along Bayou Teche was $16.00 per arpent of improved land, while some went for as much as $30.00 to $40.00 per arpent. Unimproved first quality lands often went for $10.00 per arpent. Land of lesser quality, as well as government lands, could be acquired for prices ranging from $2.00 to $10.00 per arpent (Gibson 1979:107).

There were 613 ha (1,515 ac) in cane cultivation in St. Mary Parish in 1824; during that year, the crop yielded 1,586 hogsheads of sugar, worked by 644 slaves. One year later, 504 acres were added to the total acreage planted in cane, with a harvest of 2,254 hogsheads. By 1828, there were 74 sugar producers in St. Mary Parish, harvesting a total crop of 4,528 hogsheads (Broussard and Broussard 1955:3; Degelos 1892:67).

Although not as prosperous as St. Mary Parish, the project area parish also experienced growth in sugar agriculture during the antebellum years. In 1828, there were only six sugar producers (with a total sugar crop of 169 hogsheads) recorded in Lafayette Parish, which included present-day Vermilion Parish at that time. A year later, the number of plantations had increased to 19, of which two were in the "planting" stage; the other 17 produced a total sugar crop of 434 hogsheads (Degelos 1892:67).

In 1844, there were 13 sugar planters operating along the Vermilion River. By far, the largest of these producers was Robert Cade, who came to Louisiana from South Carolina ca. 1820. Cade accumulated three plantations, one each in present-day Lafayette, St. Martin, and Vermilion Parishes. Although Cade did not live at his plantation in Vermilion Parish, it was one of only two plantations along the Vermilion River that contained a steam-powered sugar mill. Throughout the antebellum era, Cade was the most significant sugar producer in Vermilion Parish (Champomier 1844-1859; Vermilion Historical Society 1983:106).

The Civil War Era

A native of Lafayette, former Governor Alexandre Mouton, presided over the Louisiana convention of 1861 in which delegates voted overwhelmingly to secede from the Union. In April of 1862, New Orleans fell to the United States, and by the spring of 1863, General Nathaniel Banks was advancing up Bayou Teche towards the project area with over 20,000 Federal troops. A much smaller group of Confederates, commanded by General Nathaniel Brooks, contested the Federal advance. While the confederates fought effectively, they were forced to retreat.

The project region remained relatively quiet through the end of the Civil War. In early 1865, a few reports were made regarding possible blockade running out of Vermilion Bay and Cote Blanche Bay,

but there was no significant activity noted by either Confederate or Federal officers monitoring the region (*OR* 1896:48[1]:722, 1441).

Postbellum Era

The years following the end of the Civil War were difficult for southern Louisiana. The economy throughout the state had been destroyed; plantations and farms, railroads and levees, businesses and homes all had been affected by the war, physically and financially. The postbellum period proved to be an era of recovery for the entire state.

The emancipation of the slaves, which accompanied Federal victory, not only severely impacted the labor supply but also eliminated the millions of dollars planters in the region had invested in human bondage. According to one authority, abolition swept away one-third of Louisiana's wealth (Winters 1963:428).

As a result of the war, the established planters found themselves without either capital or labor. Furthermore, war severely disrupted both the transportation system and the market for sugar. The planters found themselves without influence in state and national affairs at the beginning of the postbellum era. In addition, they even had lost control of the political system such as in St. Mary Parish, where newly enfranchised blacks outnumbered whites three to one. At the first election in St. Mary Parish during 1868, two blacks, a sheriff and a parish judge, were elected, but both were murdered after they took office (Broussard and Broussard 1955:17).

Besides repairing the considerable physical damage to their holdings, sugar planters in the region who wished to resume operations had to deal for the first time with a labor supply that was not enslaved. Before labor could be hired, many obstacles had to be overcome, not least of which was the complete lack of trust exhibited on both sides in the bargaining. Nevertheless, by 1869, planters in the area were hiring workers at $15.00 to $20.00 a month for first class hands, with cabin, rations, and wood included in the bargain (Sitterson 1953:244). As might be expected, the cabins, originally slave quarters, were insubstantial structures, e.g., William T. Palfrey had hired a carpenter to build some structures at Ricohoc in the 1850s for $25.00 each (Sitterson 1953:67).

In 1869, when Bouchereau resumed the chronicle of the sugar crops that Champomier had written during the antebellum period, only a few plantations were operating along Bayou Teche (Bouchereau 1869). As a result of financial difficulties, many planters lost their estates. After the war, the industry was slow to recover from the disruption it had suffered. A pervasive lack of capital impeded the revitalization of the industry. Planters could not afford to rebuild their sugar houses, nor could they repair the levees that had been neglected during the war years. Without the proper levees, many former sugar plantations were inundated during high water. In addition, the loss of slave labor further encumbered economic recovery. Many former slaves migrated north, and those who stayed were regarded as unreliable; they were perceived by the white population as a political threat. L. Bouchereau noted that "not more than two out of every twenty sugar planters have a full compliment of laborers" (1868-1869:vii).

These fundamental obstacles necessitated great changes in the sugar industry. Since most planters lacked both the capital and the laborers to manufacture sugar, a new method was proposed by Bouchereau in 1874. He urged that the agricultural and industrial aspects of sugar production be separated. His proposal, the "Central Factory System," included centralized mills to serve the needs of many planters: "Let the sugar factories be established in different neighborhoods and let the producers of the cane sell it to the factory" (Bouchereau and Bouchereau 1874:xii-xiii).

In this way, the increased labor costs could be absorbed by the savings on mill processing and manufacturing. The system also allowed smaller farmers to participate in the sugar cane cultivation; impoverished farmers were able to grow small tracts of sugar cane to sell to the factory. Under the antebellum plantation system, small scale production had been an economic impossibility.

Rice cultivation became a viable alternative to the high cost of sugar cane production for many planters. In 1877, Bouchereau wrote: "Many of the sugar plantations are planted in rice for want of the necessary means to rebuild or repair sugar houses, etc., while others are only partially cultivated owing to the encroachment of water from crevasses, and many are completely abandoned on account of overflow" (Bouchereau and Bouchereau 1877-78:XX). Rice was a more appropriate crop for the neglected postbellum plantations since inundation, although harmful to the growth of sugar cane, was necessary for rice cultivation. Rice agriculture also was much less labor intensive than sugar cane cultivation, an added incentive to landowners facing a labor shortage (Goodwin et al. 1988).

By the end of the nineteenth century, sugar had regained its prominence as an agricultural staple. The Central Factory System caught on and was quite successful; in 1893 Bouchereau remarked: "Gradually the cultivation of cane and the manufacture of sugar from it are becoming separate and distinct industries. Men of means invest their capital in equipping first class factories furnished with all the modern improvements that the genius of the inventor has produced; small planters pursue the cultivation on the general lines...More sugar is now produced per acre than ever before" (Bouchereau and Bouchereau 1874:xii-xiii).

The Twentieth Century

The period from 1880 to 1910 was an era of consolidation. By 1880, the sugar plantation regime had recovered from the effects of the Civil War, and the chronicler (Bouchereau) of the sugar crop no longer felt it necessary to compare annual crops with the pre-invasion yield of 1862. During these years, there also was a change in the old antebellum system whereby each plantation was designated a factory as well as a farm. The development of large processing plants made it uneconomical and unnecessary for each plantation to maintain its own sugar house.

A severe decline in sugar production occurred in the years after 1911; in the 1920s, the sugar industry was confronted with extinction, and bad weather contributed to the troubles of the planter. In 1911, there were severe early frosts, and in 1912, floods damaged crops. Furthermore, plant disease, particularly mosaic, swept through the canefields with devastating effects. Another problem was the higher cost of labor, especially after the wartime economy offered better paying jobs to canefield workers. Prices for sugar were unusually low, and the new Democratic administration of Woodrow Wilson, actually passed a bill that abolished the tariff on sugar.

The world war brightened the outlook of sugar planters temporarily. Congress repealed the free sugar bill, and an international shortage raised sugar prices to their highest levels since 1889. Furthermore, in 1916, Louisiana planters produced a bountiful crop. Nevertheless, the federal government issued wartime controls that limited profits during the conflict.

After the removal of governmental controls, the sugar market entered a period of chaos. The expectation was that the price of sugar would rise on the world market. Instead, it collapsed and caught planters, manufacturers, and bankers by surprise. Louisiana sugar planters and manufacturers entered the 1920s in a severe depression from which many of them would not recover.

This economic decline increased the movement toward consolidation of sugar factories, but at the same time brought about a counter-movement in the breakup of large cane plantations. Some plantations were abandoned, while others were subdivided into smaller holdings (Sitterson 1953:343-360). Nevertheless, a long agricultural depression in the 1920s was followed by an international economic crisis in October 1929 and a decade-long worldwide depression.

CHAPTER V

PREVIOUS INVESTIGATIONS

Introduction

This chapter provides information concerning previous archeological and architectural investigations completed within the general vicinity of the Schooner Bayou project area. The information contained in this review was based on a background search of data currently on file at the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Divisions of Archaeology and Historic Preservation, in Baton Rouge. This discussion is divided into four sections. The first includes a review of all cultural resources investigations completed within 8 km (5 mi) of the proposed Schooner Bayou project area. The second section identifies those previously recorded archeological sites located within 1.6 km (1 mi) of the study area. This is followed by a description of previously recorded standing structures located within 1.6 km (1 mi) of the project area. Finally, this document contains a review of information contained within *A Database of Louisiana Shipwrecks* (Clune and Wheeler 1991).

Previously Conducted Cultural Resources Investigations within 8 km (5 mi) of the Currently Proposed Schooner Bayou Project Item

A total of three previously completed cultural resources investigations were identified within 8 km (5 mi) of the currently proposed Schooner Bayou project corridor (Table 1). These investigations resulted in the identification of a large number of archeological sites; however, none of these archeological sites were identified within 1.6 km (1 mi) of the currently proposed project area. These three surveys are discussed in chronological order and by parish below.

Vermilion Parish

On February 14, 1975, Robert Neuman conducted a Phase I cultural resources survey and archeological inventory of the Vermilion Lock area, prior to the proposed replacement of the structure (Neuman 1975). The Area of Potential Effects was located adjacent to the Intracoastal Waterway, i.e., approximately 2.9 km (1.8 mi) west of the Vermilion River in Vermilion Parish, Louisiana. Neuman (1975) did not report the size of the area he examined, however, a helicopter survey of the proposed project area failed to identify any cultural resources. No additional testing of the proposed Vermilion Lock replacement area was recommended.

During 1988, the Museum of Geoscience, Louisiana State University, in Baton Rouge, conducted a National Register of Historic Places eligibility assessment of the Vermilion Lock (Treffinger 1988). The assessment was conducted on behalf of the U.S. Army Corps of Engineers, New Orleans District.

Table 1. Cultural Resources Investigations Completed within 8 km (5 mi) of the Currently Proposed Schooner Bayou Project Item.

FIELD DATE	REPORT NUMBER	TITLE/AUTHOR	INVESTIGATION METHODS	RESULTS AND RECOMMENDATIONS
VERMILION PARISH				
1975	22-84	*Archaeological Survey of the Vermilion Lock Replacement, Louisiana* (Neuman 1975)	Records review and helicopter survey	No cultural resources were identified; no additional testing was recommended.
1988	22-1357	*Evaluation of the National Register Eligibility of the Vermilion Lock, Vermilion Parish, Louisiana* (Treffinger 1988)	Records review and pedestrian survey	The Vermilion Lock was assessed as not significant. In addition, seven structures associated with the lock also were assessed as not significant.
MULTIPLE PARISHES				
1975	22-106	*Archeological Investigations Along the Gulf Intracoastal Waterway: Coastal Louisiana Area* (Gagliano et al. 1975)	Records review, boat survey, and limited pedestrian survey	Identified 158 prehistoric sites and 42 historic sites. Of these, 136 sites were assessed as significant while the significance of the remaining sites was unknown. Various levels of testing were recommended for the identified sites.

Treffinger (1988) noted that the lock was constructed in 1933 and that it measured 17.1 m (56 ft) in width and approximately 360.3 m (1,182 ft) in length. In addition, a pedestrian survey of the overall area resulted in the identification of seven associated structures. Treffinger (1988) noted that the buildings represented the remains of 12 structures associated with the Vermilion Lock complex. None of these structures possessed the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional recordation of these structural remains was recommended. Treffinger (1988) assessed the Vermilion Lock as not significant applying the same National Register of Historic Places criteria. No additional recordation of the Vermilion Lock was recommended.

Multiple Parishes

In June 1975, Coastal Environments, Inc., performed an archeological investigation of the Gulf Intracoastal Waterway at the request of the U.S. Army Corps of Engineers, New Orleans District (Gagliano et al. 1975). The survey consisted of a pedestrian survey of an approximately 60 m (200 ft) wide corridor that extended for 504 km (315 mi) along the length of the Gulf Intracoastal Waterway and selected spurs situated at various bayou crossings. As a result of this investigation, 158 prehistoric and 42 historic period sites were identified. Of the 158 prehistoric period sites recorded, 78 were found as exposures positioned along the banks of the waterway or in adjacent spoil disposal piles. Since the Gulf Intracoastal Waterway already had been constructed at the time of survey, Gagliano et al. (1975) provided treatment plans for the sites they identified, and these were based on the significance and the relative degree of damage expected at each cultural resource locus. Only five of the sites (16CM20, 16JE36, 16JE56, 16OR57, and 16OR58) were assessed as "very important" and immediate salvage excavation was recommended. An additional nine sites (16CU19, 16IB112, 16IV4, 16LF36, 16LF78, 16SM6,

16SM14, 16SMY19, and 16SMY132) were characterized as "important" and shovel testing throughout each of these areas was recommended. A majority of the sites (16AS19, 16AS20, 16CU15, 16CU125, 16CU126, 16CM58, 16CM75, 16CM77, 16CM78, 16IB110, 16IB111, 16JE53 - 16JE55, 16LF75 - 16LF77, 16LF79 - 16LF81, 16OR41, 16OR53, 16OR55, 16SMY44, 16SMY125 - 16SMY130, 16SMY134, 16TR62, 16TR84, 16TR87, 16VM33, and 16VM35 - 16VM37) identified by Gagliano et al. (1975) were assessed as "moderately important," and limited testing was recommended, but only if the width of the waterway was expanded. None of the sites identified by Gagliano et al. (1975) are located within 1.6 km (1 mi) of the currently proposed project area.

Previously Recorded Archeological Sites Located within 1.6 km (1 mi) of the Schooner Bayou Project Area

A review of the site files maintained by the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Archaeology, in Baton Rouge, failed to identify any previously recorded archeological sites located within 1.6 km (1 mi) of the currently proposed Schooner Bayou project corridor.

Previously Recorded Historic Standing Structures Located within 1.6 km (1 mi) of the Currently Proposed Schooner Bayou Project Area

A review of the standing structure files maintained by the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Historic Preservation, failed to identify any previously recorded historic standing structures within 1.6 km (1 mi) of the currently proposed Schooner Bayou project item.

Previously Recorded Shipwrecks Located within 1.6 km (1 mi) of the Currently Proposed Schooner Bayou Project Area

As a part of this investigation, *A Database of Louisiana Shipwrecks* (Clune and Wheeler 1991), housed at the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Archeology was examined. This examination failed to identify any vessels that had been lost within 1.6 km (1 mi) of the currently proposed Schooner Bayou project area. Additionally, a search of AWOIS and the Coast Guard data bases failed to locate any vessels loss within the study area.

CHAPTER VI

RESEARCH METHODS

Archival Investigations-Maritime Resources

Archival research for North Prong, Schooner Bayou, Vermilion Parish, Louisiana, Bank Stabilization project was focused on identifying previously recorded sites of shipwrecks and other obstructions. Literature on shipwrecks, AWOIS (Automated Wreck and Obstruction Information System), U.S. Coast Guard's *Aids to Navigation*, and U.S. Coastal and Geodetic Service nautical charts, historic maps, U.S. Army Corps of Engineers reports sited in this report were researched at the Library of Congress in Washington, D.C. and at the National Archives in Washington D.C. and at College Park, Maryland. *A Database of Louisiana Shipwrecks* (Clune and Wheeler 1991) also was reviewed.

Nautical Charts and Maps

Federally produced nautical charts by the National Oceanic and Atmospheric Administration and the United States Geologic Survey are found at the National Archives and Library of Congress. They are surveys of ocean features beginning in the 1860s and continuing to the present. The maps are intended to guide ships through waterways by marking depths, given in fathoms, and buoy positions. The listing of wrecks and other obstructions, such as piles, and dumping areas begins in the 1930s.

Chart no.1007-A, a U.S. Coastal and Geodetic Service map lists sites of World War II sunken vessels in the Gulf of Mexico. Although this chart is titled as containing World War II wreckage, some of the sites are described as having been located in the Gulf before the 1940s. Prepared by the military in 1942, the chart lists 51 wrecks. Vessel information on the map includes name, nationality, type of ship, location of sinking, other locations given for the sinking, whether the wreck had a buoy placed over it, depth wreckage lies in, and item number for each vessel.

Books

The following books with lists of shipwrecks were also examined as corroborative evidence for other sources examined for this report:

Beneath the Waters: A Guide to Civil War Shipwrecks (Hemphill 1998);
Encyclopedia of American Shipwrecks (Berman 1972);
A Guide to Sunken Ships in American Waters (Lonsdale and Kaplan 1964);
Merchant Steam Vessels of the United States, 1790-1868 ("The Lytle-Holdcamper List") (Mitchell 1975);
Way's Steam Towboat Directory (Way, Jr. 1990);
Wreck List Information (Hydrographic Office, U.S. Navy 1945).
Way's Packet Directory, 1848-1994 (Way, Jr. 1983);

Archeological Investigations

The North Prong, Schooner Bayou, Vermilion Parish, Louisiana, Bank Stabilization project marine remote sensing survey was conducted from the 24 ft research vessel *Coli. Coli* was leased from the Louisiana Universities Marine Consortium (LUMCON). The survey area for this project consisted of one survey block or area. The area measures 10,560 ft (3,219 m) in length by 70 ft (21.34 m). The survey was conducted along parallel track lines spaced at 25 ft (7.62 m) intervals. In total, approximately 8 linear miles or 42,240 linear feet of river bottom were surveyed. The project area is located in North Prong, between the GIWW and Schooner Bayou, near the Schooner Bayou Control Structure, Louisiana.

The remote sensing survey was designed to identify specific magnetic or acoustic anomalies and/or clusters of anomalies that might represent potentially significant submerged cultural resources, such as shipwrecks. The natural and anthropogenic forces that form such sites typically scatter ferrous objects like fasteners, anchors, engine parts, ballast, weaponry, cargo, tools, and miscellaneous related debris across the river bottom. These objects normally can be detected with a marine magnetometer, side scan sonar system, and fathometer that record anomalous magnetic or acoustic underwater signatures that stand out against the ambient magnetic or visual field. Two critical elements in the interpretation of such anomalies, which may also result from natural or modern sources, are their patterns and, in the case of magnetic anomalies, their amplitude and duration. Because of the importance of anomaly patterning, accurate recording and positioning of anomaly locations is essential.

The equipment array used for the Schooner Bayou survey included a DGPS, a proton precession marine magnetometer, a side scan sonar, and a digital recording fathometer (Figure 4). Data were collected and correlated via a laptop computer using hydrographic survey software.

Positioning

A Differential Global Positioning System (DGPS) was used to direct navigation and supply accurate positions of magnetic and acoustic anomalies. The DGPS system consisted of a Northstar 941XD with internal DGPS. The Northstar 941XD transmitted position information in NMEA 0183 code to the computer navigation system (version 7.4 of Coastal Oceanographics' *Hypack* software).

Hypack translates the NMEA message and displays the survey vessel's position on a computer screen relative to the pre-plotted track lines. During post-processing, *Hypack's* positioning files can be utilized to produce track plot maps and to derive the X, Y, and Z values used to produce magnetic and bathymetric contour plot maps. For the Schooner Bayou marine remote sensing survey, positioning control points were obtained continuously by *Hypack* at one-second intervals. During the course of the survey, strong differential signals were acquired with a minimum noise to signal ratio.

Magnetometry

The proton precession marine magnetometer is an electronic instrument used to record the strength of the earth's magnetic field in increments of nanoTeslas or gammas. Magnetometers have proven useful in marine research as detectors of anomalous distortions in the earth's ambient magnetic field, particularly distortions that are caused by concentrations of naturally occurring and manmade, ferrous materials. Distortions or changes as small as 0.5 gammas are detectable when operating the magnetometer at a sampling rate of one second. Magnetic distortions caused by shipwrecks may range in intensity from several gammas to several thousand gammas, depending upon such factors as the mass of ferrous

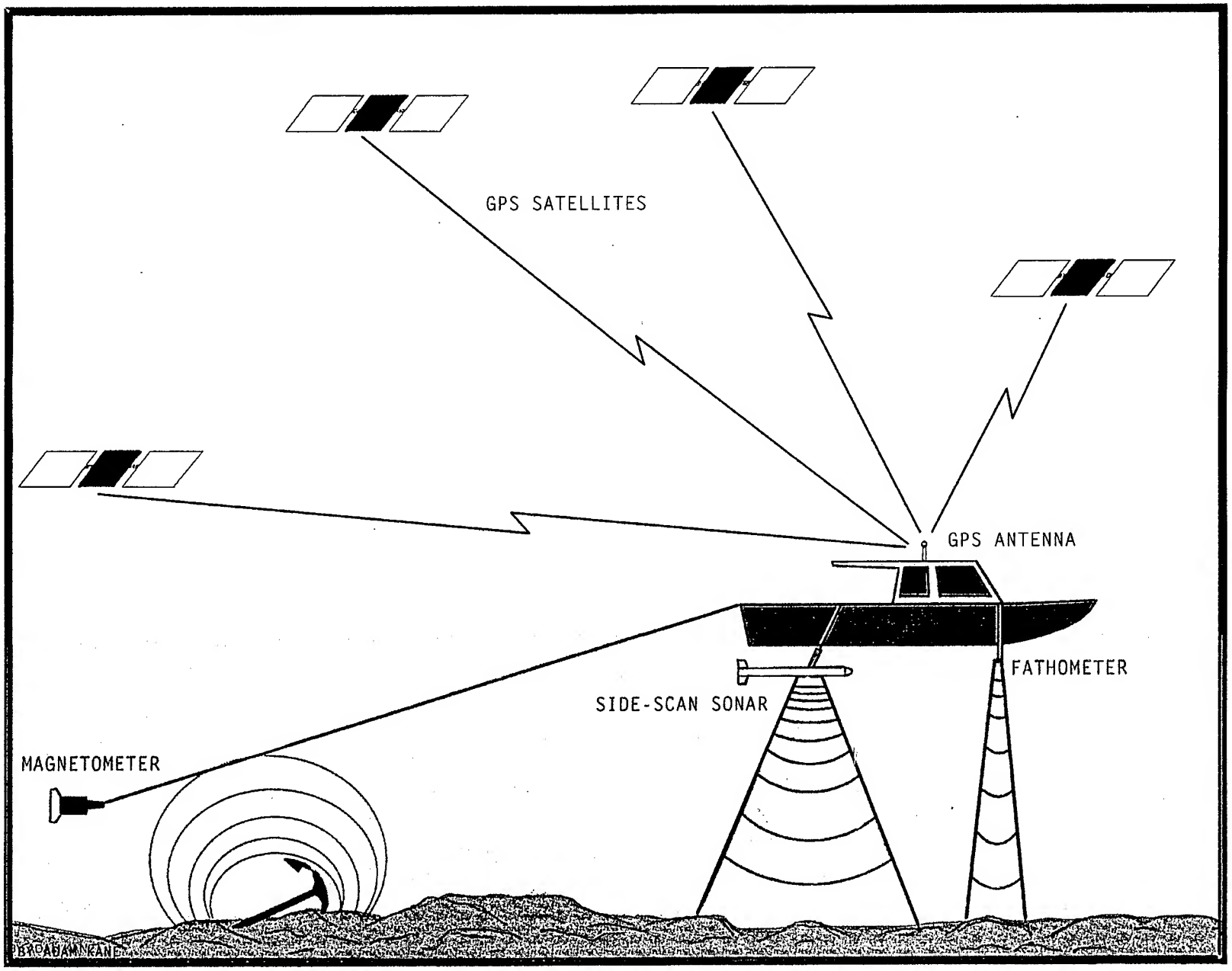

Figure 4. Drawing showing the array of remote sensing and positioning equipment utilized during the Schooner Bayou Marine Survey Project.

materials present, the distance of the ferrous mass from the sensor, and the orientation of the mass relative to the sensor. The uses of magnetometers in marine archeology and the theoretical aspects of the physical principals behind their operation are summarized and discussed in detail in Aitken (1961), Hall (1966, 1970), Tite (1972), Breiner (1973), Weymouth (1986), and Green (1990).

Individual anomalies produce distinctive magnetic "signatures." These individual signatures may be categorized as 1) positive monopole; 2) negative monopole; 3) dipolar or 4)-multi component (Figure 5). Positive and negative anomalies refer to monopolar deflections of the magnetic field and usually indicate a single source. They produce either a positive or negative deflection from the ambient magnetic field, depending on how the object is oriented relative to the magnetometer sensor and whether its positive or negative pole is positioned closest to the sensor. Dipolar signatures display both a positive and negative magnetic field; they also are commonly associated with single source anomalies, with the dipole usually aligned across the axis of the magnetic field and the negative peak of the anomaly falling nearest the North Pole.

Especially important for archeological surveys are multi-component anomalies. Multi-component or complex signature anomalies consist of both dipolar and monopolar magnetic perturbations associated with a large overall deflection that can be indicative of the multiple individual ferrous materials comprising the debris patterns typically associated with shipwrecks.

The complexity of the signature is affected partially by the distance of the sensor from the debris and the quantity of debris. If the sensor is close to the wreck, the signature will be multi component; if far away, it may appear as a single source signature.

A Geometrics G866 proton precession marine magnetometer was used to complete the magnetic survey of the Schooner Bayou project area. The G866 is a 0.1 gamma sensitivity magnetometer that downloads magnetic data in digital format as numeric data files in *Hypack*. As the magnetic data are being collected, *Hypack* attaches the precise real-time DGPS coordinates to each magnetic reading, thus ensuring precise positioning control. The magnetometer was towed far enough behind the survey vessel to minimize the associated noise, which generally measured less than two gammas. A float was attached to the magnetometer sensor, so that a consistent depth below the water's surface could be maintained in the shallow waters of Schooner Bayou.

Acoustic Imaging

Over the past 25 years, the combined use of acoustic (sonar) and magnetic remote sensing equipment has proven to be the most effective method of identifying submerged cultural resources and assessing their potential for further research (Hall 1970; Green 1990). When combined with magnetic data, the near photographic-quality acoustic records produced by side scan sonar systems have left little doubt regarding the identifications of some targets that are intact shipwrecks (Figure 6). For targets lacking structural integrity or those partially buried beneath bottom sediments, identification can be extremely difficult. Because intact and exposed wrecks are less common than broken and buried wrecks, remote sensing surveys generally produce acoustic targets that require ground-truthing by divers to determine their identification and historic significance.

An Imagenex color imaging digital side scan sonar system was utilized continuously during the Schooner Bayou survey to produce sonograms of the river bottom on each transect within the project area. The Imagenex system consisted of a Model 858 processor coupled with a Model 855 dual transducer tow fish operating at a frequency of 330 KHz. The sonar was set at a range of 120 ft per channel, which yielded overlapping coverage of the study areas. Sonar data were recorded in a digital

format on a 1.2 GB Omega Jazz drive. A stream of time-tags was attached continuously to the sonar data to assist in post-processing correlation of the acoustic and magnetic data sets. Acoustic images were displayed on a VGA monitor as they were recorded during the survey, and an observation log was maintained by the sonar technician to record descriptions of the anomalies and the times and locations associated with each target. Potential targets were inventoried both during the survey and in post-processing.

Bathymetric Data

A digital recording fathometer was used to record the river bottom topography. This data was transmitted NMEA 0183 code to the computer navigation system (version 7.4 of Coastal Oceanographics' *Hypack* software). *Hypack* translates the NMEA message and displays the depth on a computer screen relative to the pre-plotted track lines. During post-processing, *Hypack's* bathymetric files are utilized to produce bathymetric contour plot maps. These maps are consulted to ascertain whether or not there are bathymetric correlations with the other instrument readings.

The methodology employed during the survey produced favorable results, with reliable DGPS signals, low noise levels on the magnetometer, and clear acoustic images. All positioning and remote sensing equipment performed reliably throughout the survey. Regular and evenly spaced coverage of the entire survey area was achieved.

Survey Control and Correlation of Data Sets

The *Hypack* survey software provided the primary method of control during the survey. Survey lanes were planned in *Hypack*, geodetic parameters were established, and instruments were interfaced and recorded through the computer software. During the survey, the planned survey lines were displayed on the computer screen, and the survey vessel's track was monitored. In addition to providing steering direction for the helmsman, *Hypack* allowed the surveyors to monitor instruments and incoming data through additional windows on the survey screen.

All remote sensing data were correlated with DGPS positioning data and time through *Hypack*. Positions for all data then were corrected through the software for instrument layback and offsets. Positioning was recorded using Louisiana South State Plane grid coordinates, referencing the North American Datum of 1983 (NAD-83). The WGRS-1984 ellipsoid was used, along with a Lambert projection.

Remote Sensing Data Analysis

Magnetic and acoustic data were analyzed in the field while they were generated, and post-processed using *Hypack* and Autodesk's *AutoCAD* computer software applications. These computer programs were used to assess the signature, intensity, and duration of individual magnetic disturbances, and to plot their positions within the project area.

In the analysis of magnetometer data for this survey, individual anomalies were identified and carefully examined. First, the profile of each anomaly was characterized in terms of pattern, amplitude, and duration. Magnetic data were correlated with field notes, so that deflections from modern sources, such as channel markers, could be identified. Although all anomalies with an amplitude greater than ten

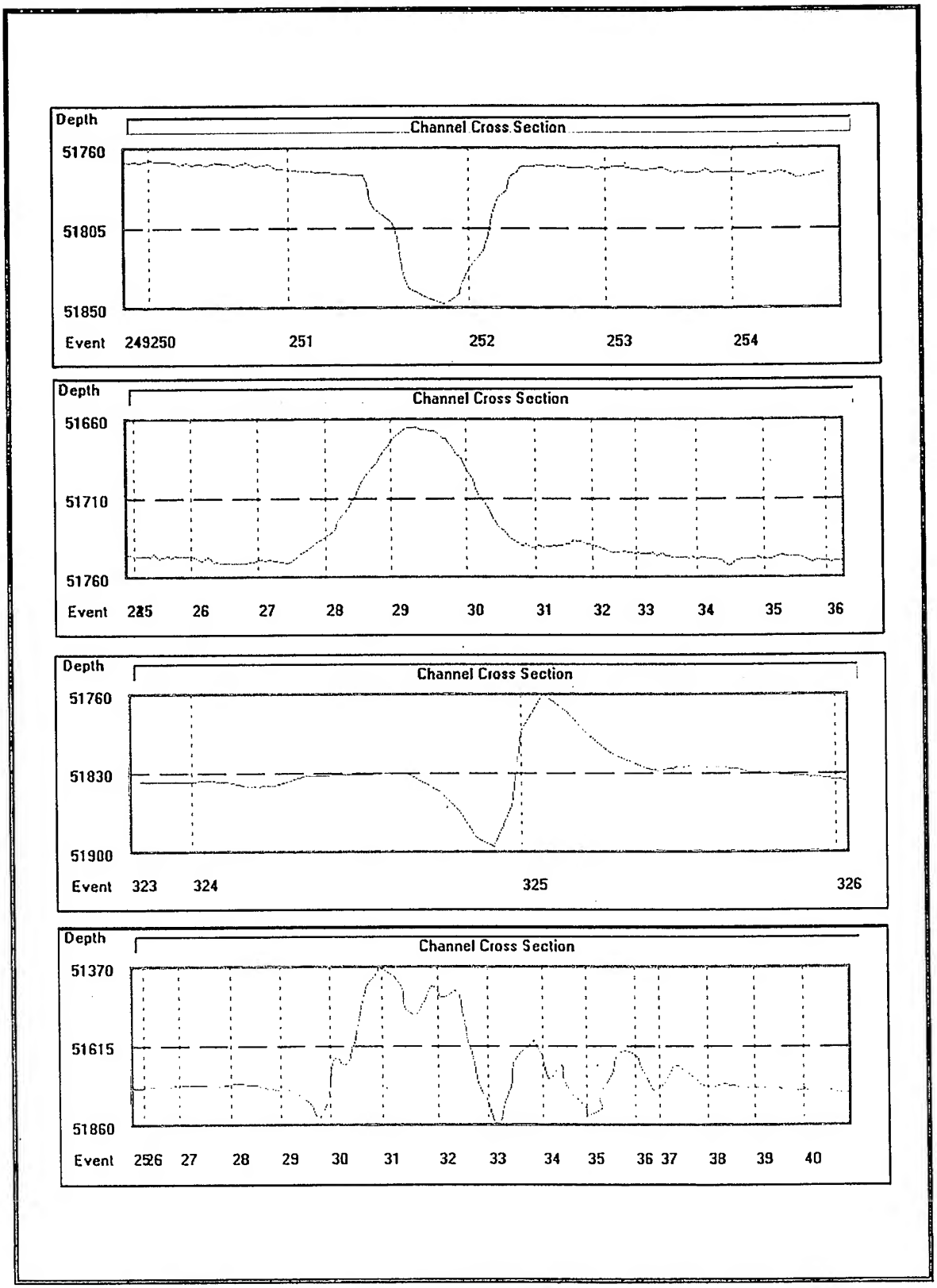

Figure 5. *Hypack* "Edit" screen images illustrating magnetic anomalies with positive monopolar, negative monopolar, dipolar, and multicomponent signatures. The positive and negative signatures appear inverted, because *Hypack* records the magnetic readings as "depths"; therefore, "higher" positive readings appear to trend downward rather than upward.

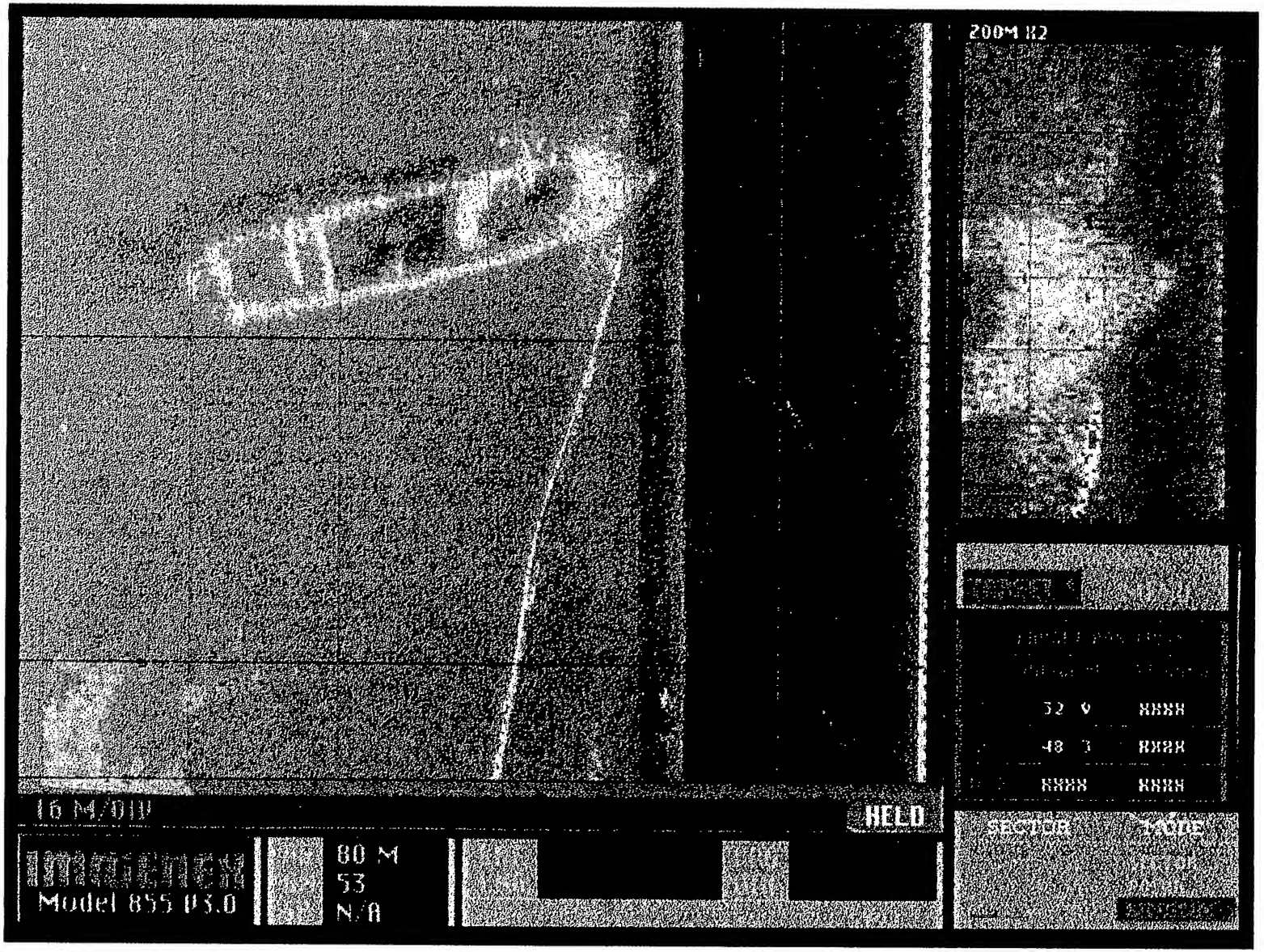

Figure 6. Imagenex 858 side scan sonar image of a submerged shipwreck

gammas were given a magnetic anomaly number for reference purposes and tabulation; anomalies of larger amplitude (more than 50 gammas) and of longer duration (more than 20 seconds) generally are considered to have a higher likelihood of representing possible shipwreck remains, especially when such anomalies cluster together.

Side scan sonar data were examined for anomalous acoustic targets and shadows that might represent potentially significant submerged cultural resources, and to correlate with any magnetic or bathymetric anomalies.

Vessel Classes Expected in the Schooner Bayou Study Area

Aboriginal use of the Bayou Teche Complex and adjacent regions for extractive purposes may extend back to the Late Archaic period (Gibson and Shenkel 1988). The native watercraft used throughout this period and into the Protohistoric and Early Historic Periods was the log dugout canoe. These ranged in size from small canoes for one or two paddlers, to larger vessels well over 40 feet in length for large groups. These canoes were the main mode of transportation in the coastal area and bayous.

Prior to the construction of good roads and to the completion of rail systems in south Louisiana, settlement and transportation focused on and utilized the waterways as a means of livelihood and communications. Boats played an integral part of daily life, and boat traditions in south Louisiana remains strong today. Large boats brought goods from the port of New Orleans to settlements upriver and along the bayous, and transported timber, furs, fish, and other goods to market (R. Christopher Goodwin & Associates 1984: 37). During the Historic Period, the vernacular vessel type of choice was the classic Acadian Pirogue (dugout canoe) from 10 to 30 feet long; this fairly narrow vessel was poled. The pirogue was the common workhorse of the Acadian settlers in the study area. As the need for larger vessels grew with the increase in trade and farming, a new vessel type was developed called the Bateau Plats (Flat Boat). The flatboat varied in size for twenty to sixty feet in length. Hull construction consisted of large square timbers of hardwood, drawing a foot to two feet of water when fully ladened (Goodwin 1984:38). Cabins were constructed on the deck, with access to the roof as another deck. Flatboats were guided by oars on the sides and stern, and steered from the bow with a short oar. Flatboats were used only for downstream transportation, and were sold downriver or dismantled for lumber (Leaky 1931:43). Flatboats primarily carried freight, rather than passengers.

The barge was a larger, two masted boat with accommodations for passengers. It was fitted with a covered cargo area over much of its length, and had a carrying capacity from 60 to 100 toms. A cabin area, usually about six by eight feet, served as quarters for sleeping (Leaky 1931:45). These boats sometimes were pointed at both bow and stern, or had a pointed bow and blunt stern.

Keelboats were long, narrow boats with a shallow draft (Durant 1953: 126). They averaged sixty to seventy feet in length, with a fifteen to eighteen foot beam. The boat was pointed at both ends, and was fitted with a keel extending the length of the bottom of the boat to enable it to absorb the shock of contact with submerged obstructions. A cargo box, some four to five feet above the deck, covered the body of the boat except for decked areas at the bow and stern. Narrow footways about fifteen inches wide ran around the gunwales, providing walkways for the crew (Durant 1953:126; Leaky 1931:46). The boat was rowed or poled, or sail-assisted using a square sail rigged to a mast in the bow of the boat. They could carry between fifteen and fifty tons of cargo, but seldom more than thirty (Haites 1969:31). Many keelboats were made in Pittsburgh and later in Louisville. The journey from Pittsburgh to New Orleans took about two months; the return trip took four months (Durant 1953:126).

Two other boat types served as cargo carriers on large rivers and bayous. Smaller versions of these boats were used on the smaller streams and bayous. The bateau was a wide, flat-bottomed, keelless boat, with pointed bow and stern. It was propelled by oars, using a shorter oar as a rudder (Leaky 1931:42). The term bateau was used early in settlement of the Mississippi Valley, and was adopted by English speakers during the flatboat period beginning about 1800. Another boat style with blunted bow and stern was termed radeau.

During the last part of the eighteenth century, large double-ended flatboats, forerunners of the barge described above, were called "skiffs" (Knipmeyer 1956). Both bateau and skiff (esquiff) have come to have specialized meanings in French South Louisiana that differ from the eighteenth and nineteenth century definitions. Both terms designate small craft, under twenty feet in length, that are used on the inland waterways primarily for fishing and ferrying. Neither of these types has both pointed bow and stern; rather, the modern day bateau is a narrow craft with blunted prow and stern. It had a sharp bow and stern and was wider amidships than the pirogue. The flat boat rated as much as10 tons to 30 tons in displacement, and could be poled or rowed through narrow bayous and channels.

Another important class of historic vessel used in the study area is the steamboat. Steamboats encompassed a vast range of sizes and displacements; they all featured shallow drafts and narrow beams in order to work in the bayous. These vessels were constantly being bilged (broken open) by trees and logs, and were forced to work the more shallow bayous only during the high water periods.

The last class of vessel that may have been in the study area is a hybrid sail/gas vessel that reflects a vernacular style of construction that is poorly understood or recorded. This type of motor/sail vessel reflects European origins with vernacular morphological changes is the Pointu Les deux Bouts, or the double ended boat, powered by sail and gas engine (Goodwin 1984: 82). The one documented vessel of this design is the *Fox* (as recorded in "Evaluation of the National Register Eligibility of the M/V Fox, an Historic Boat in Lafourche Parish, Louisiana." This boat has a carvel style hull built from local cypress wood. A carvel style hull means that the planking that makes up the outside hull is abutted side-to-side, rather than lap-strake, or overlapping hull planks. The *pointu les deux* bouts vessel, as the name indicated, had a double-ended hull with two mast steps in the keel. A two cycle gas engine supplied power when not under sail. The Fox had a length of 37 feet (11.28 m) with a beam of nine feet (2.74 m), and drew three feet of water. It had two cabins fore-and-aft, and a completely planked deck area. The vessel design is thought to be similar to a class of double ended vessels that are common to the nearshore, and harbor trades of the French Mediterranean (Goodwin 1984: 82).

CHAPTER VII

RESULTS OF REMOTE SENSING

The following discussion reviews the results of the marine remote sensing survey of the Schooner Bayou Project in the delta of the Mississippi River. A general overview is followed by a description of the targets located in the survey area. Figures 7a and 7b show the spatial distribution of the magnetic and acoustic anomalies, as well as the related target areas. These anomalies were identified initially by reading individual trackline data sets, then by analysis of contoured plots.

General Overview of the Survey Results

A total of 51 magnetic anomalies (Table 2) were detected during the Schooner Bayou survey. Additionally, a total of seven acoustic anomalies (Table 3) were recorded with 1 correlating to magnetic anomalies. Nine targets (Table 4) were determined for this project area that have magnetic anomalies and/or acoustic disturbances that are possibly associated and form a target. These targets were specifically analyzed by remote sensing specialists using a myriad of tools, which include analysis of the signatures, durations, amplitudes, and by contouring using Surfer software in order to determine each target's significance.

Two of the targets determined from this survey are known objects that were recorded during the survey (Target #3 and #7). Target #3 is a gas transport pipeline crossing Schooner Bayou (Figure 8). The other target identified during the survey is Target #7. This target is associated with a sheet steel bulkhead and debris located at a fishing camp along the bayou. The other targets identified from this survey resulted from post processing of the data and thorough analysis of the findings. These targets were identified as modern ferrous debris and do not represent significant cultural resources.

Target #1

Two magnetic anomalies (M13 and M36) and one acoustic anomaly (A4) comprise Target #1. M13 and M36 have medium amplitudes of 29.5 and 36 gammas respectively, with short durations of 10 seconds (Figure 9). This target's magnetic signatures are indicative of modern ferrous debris. The acoustic image associated (Figure 10) with this disturbance, clearly shows an isolated section of pipe. This target is not representative of a significant cultural resource and no further work on this target is recommended.

Target #2

Target #2 is comprised of two magnetic anomalies (M14 and M35). M14 and M35 are dipolar anomalies, each with 38.5 gammas and of medium duration (Figure 11). No acoustic anomalies are associated with this target. These anomalies' signatures are not indicative of significant cultural

resources, thus the target is believed to be an isolated piece of modern ferrous debris. No further work on this target is deemed necessary.

Target #3

Target #3 is a gas pipeline that is marked as such on the bank of the bayou (see Figure 8). The magnetic anomalies associated with the pipeline (M10, M15, M34, and M47) have extremely high amplitude values of 1,490, 791.5, 798.5, and 137 gammas respectively and are all of medium duration (Figure 12). This target does not have an acoustic anomaly associated with it as the pipeline was buried beneath the sediments. No further work in recommended for this target, however caution is recommended when working near the gas pipeline.

Target #4

Two magnetic anomalies (M17 and M33) comprise Target #4. M33 has a very high amplitude of 672 gammas and is dipolar with medium duration (Figure 13). M17 has 56 gammas and is a negative monopole of short duration. There are no associated acoustic disturbances with these anomalies and the magnetic signatures are not indicative of significant cultural resources. Thus, this target is believed to be an area of scattered modern ferrous debris that is buried within the sediments. No further work is warranted for this target

Target #5

Target #5 has three magnetic anomalies (M7, M18, and M32). This target is believed to be an area of scattered debris lying only slightly buried under the sediment because of the high gamma returns of anomalies M7 and M18 of 950 and 233.5 gammas respectively. M32 has medium gammas of 70. All three anomalies are dipoles with medium durations (Figure 14). These anomalies' signatures are not indicative of significant cultural resources, thus no further work on this target is necessary.

Target #6

Two magnetic anomalies (M31 and M42) comprise Target #6. Both anomalies are dipoles that have 50 and 54 gammas respectively and are of short durations (Figure 15). No acoustic anomalies are associated with this target. This target represents an area of scattered modern ferrous debris and not significant cultural resources. No further work on this target is recommended.

Target #7

Target #7 is a sheet steel bulkhead situated in the bayou near a fishing camp. The magnetic anomalies associated with this target are M3, M19, and M30. These anomalies are dipolar and multi-component of medium duration and have high amplitude values of 180, 124.5 and 149 gammas respectively (Figure 16). Pattern analyses of the anomalies are indicative of a large metal bulkhead. No acoustic image is associated with the anomalies. This target requires no further work.

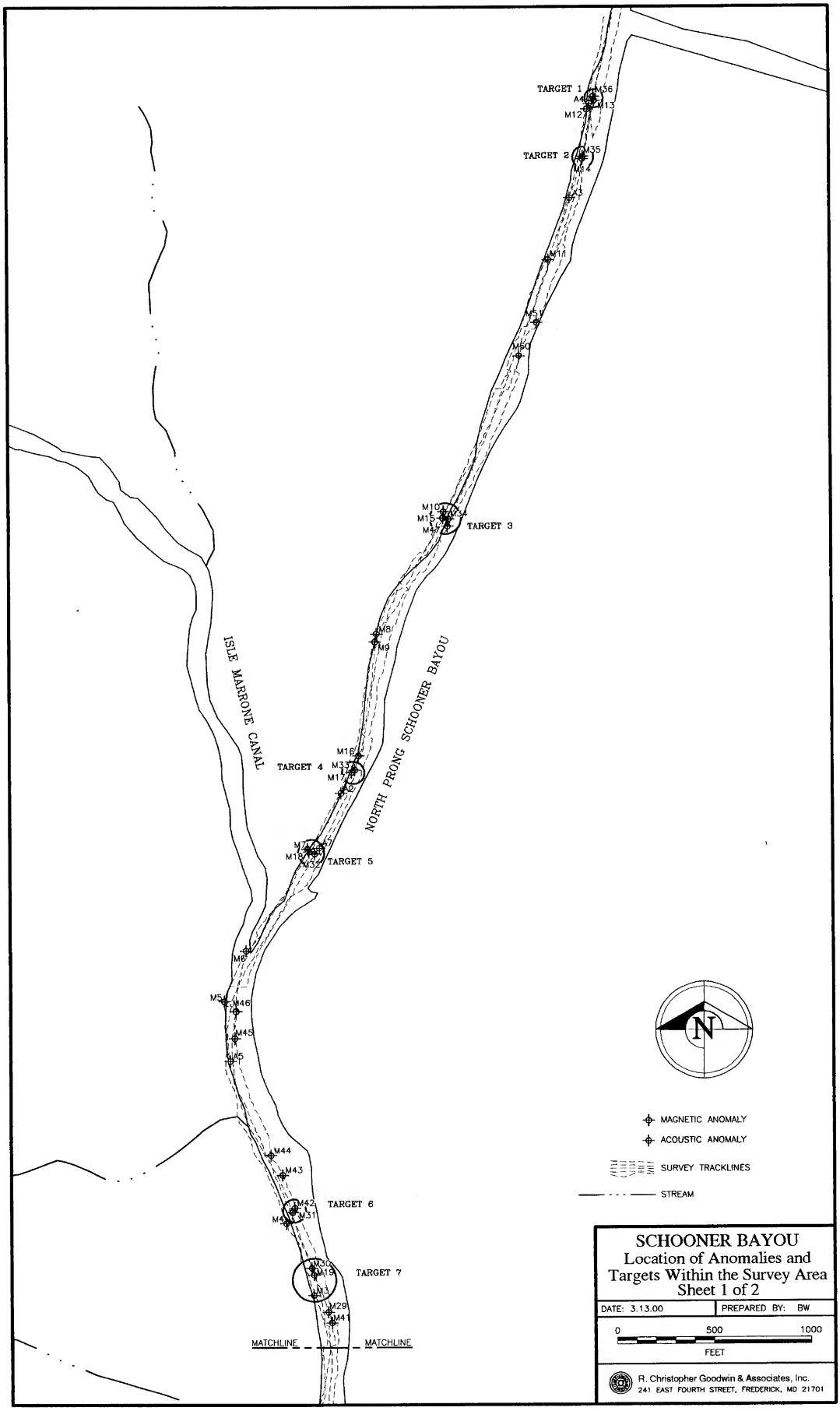

Figure 7a. Location of anomalies and targets within the survey area (Sheet1 of 2).

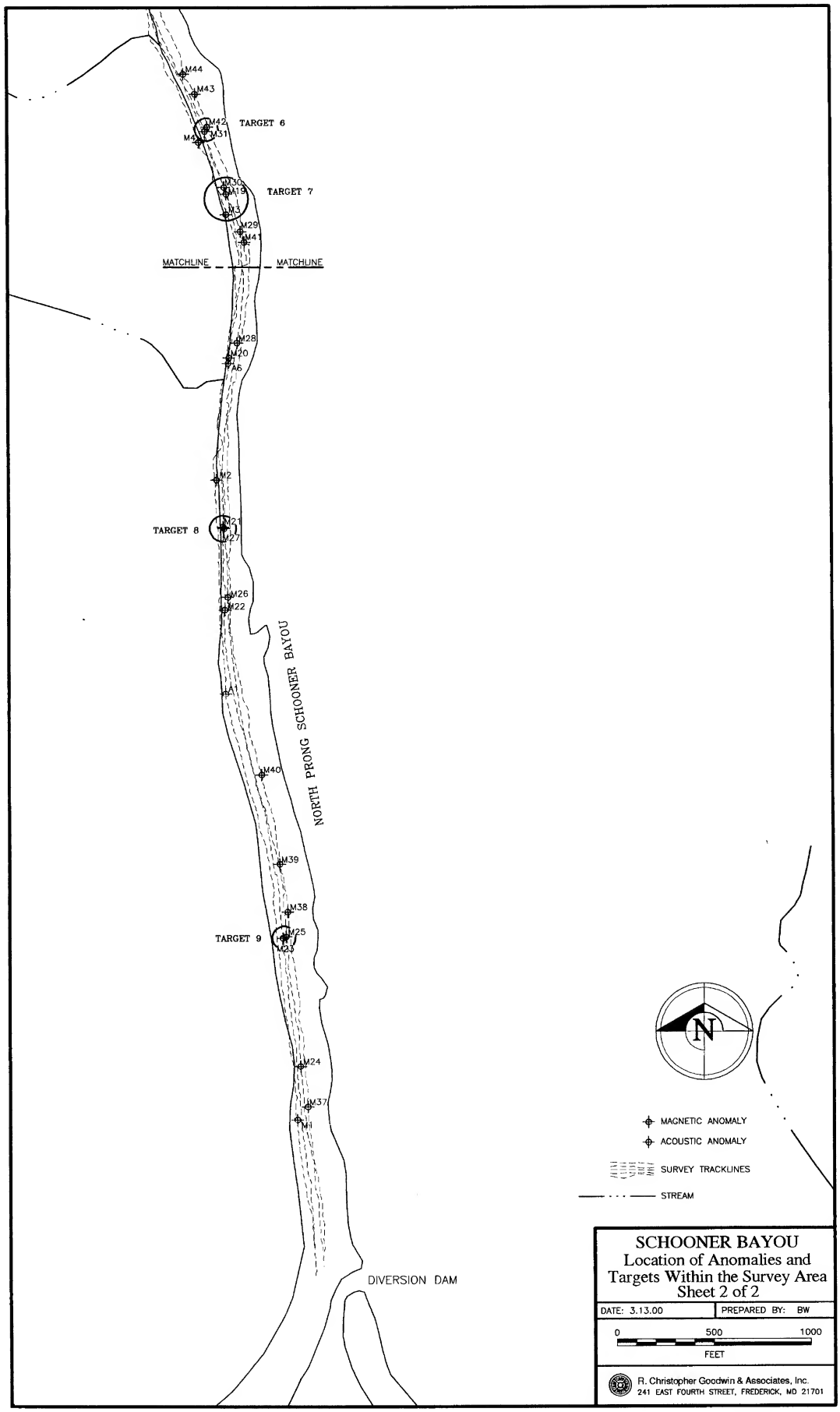

Figure 7b. Location of anomalies and targets within the survey area (Sheet2 of 2).

Table 2. Magnetic Anomalies in North Prong Survey Area

Mag #	Line #	Start	End	Duration	Signature	Gamma	X	Y	COMMENTS
M1	1	15:08:59	15:09:12	0:00:13	+	30	2986398.7	461447.8	
M2	1	15:18:37	15:18:54	0:00:17	MC	250	2985993.4	464760.6	
M3	1	15:21:08	15:21:17	0:00:09	D	180	2986047.1	466136.4	bulkhead near camp
M4	1	15:24:26	15:24:31	0:00:05	+	190	2985906.2	466509.8	
M5	1	15:27:52	15:27:59	0:00:08	D	30	2985591.4	467659.5	
M6	1	15:28:39	15:28:44	0:00:05	+	30	2985705	467923.9	
M7	1	15:30:21	15:30:28	0:00:07	D	950	2986025.5	468451.3	
M8	1	15:31:52	15:32:02	0:00:10	D	300	2986386.1	469562.1	
M9	1	15:33:28	15:33:35	0:00:07	D	30	2986378.3	469521.3	
M10	1	15:35:26	15:35:52	0:00:26	D	1490	2986735.5	470197	Gas Pipeline
M11	1	15:39:26	15:39:33	0:00:07	D	130	2987285.2	471501.2	
M12	1	15:41:38	15:41:46	0:00:08	+	510	2987488.8	472283.7	
M13	2	15:46:27	15:46:38	0:00:11	D	29.5	2987526.2	472329.5	
M14	2	15:47:26	15:47:45	0:00:19	D	38.5	2987463.6	472026.4	
M15	2	15:53:40	15:54:21	0:00:41	+	791.5	2986732.5	470164.4	Gas Pipeline
M16	2	15:58:01	15:58:15	0:00:14	D	38	2986290.7	468933	
M17	2	15:58:19	15:58:28	0:00:09	-	56	2986255.2	468847.4	
M18	2	15:59:47	16:00:04	0:00:17	D	233.5	2986032.4	468436.2	
M19	2	16:07:03	16:07:25	0:00:22	MC	124.5	2986047.40	466241.8	bulkhead near camp
M20	2	16:09:51	16:10:21	0:00:30	D	97	2986059	465396.1	
M21	2	16:12:22	16:12:48	0:00:26	MC	79.5	2986024.7	464516.3	
M22	2	16:13:36	16:14:17	0:00:41	MC	69	2986033.3	464086.3	
M23	2	16:19:14	16:19:30	0:00:16	D	113.5	2986326.4	462385.9	
M24	3	16:28:47	16:29:01	0:00:14	D	30	2986415.8	461724.5	
M25	3	16:30:33	16:30:47	0:00:14	D	53	2986342.9	462392.8	
M26	3	16:34:59	16:35:43	0:00:44	MC	154.5	2986048.6	464152.3	
M27	3	16:36:08	16:36:20	0:00:12	-	71	2986030.3	464509.3	
M28	3	16:38:37	16:38:47	0:00:10	D	41	2986100.9	465472.6	
M29	3	16:39:59	16:40:17	0:00:18	D	96.5	2986120.5	466047.7	
M30	3	16:40:39	16:40:53	0:00:14	D	149	2986036.9	466276.8	bulkhead near camp
M31	3	16:41:31	16:41:41	0:00:10	D	50	2985937.8	466566.9	
M32	3	16:46:39	16:47:16	0:00:37	D	70	2986062.1	468426.4	
M33	3	16:48:03	16:48:17	0:00:13	D	672	2986270.9	468859.7	

Mag #	Line #	Start	End	Duration	Signature	Gamma	X	Y	COMMENTS
M34	3	16:51:31	16:52:02	0:00:31	+	798.5	2986760.6	470159.2	Gas Pipeline
M35	3	16:56:55	16:57:09	0:00:14	D	38.5	2987466.3	472039.1	
M36	3	16:57:47	16:57:57	0:00:10	D	36	2987522.5	472349	
M37	4	17:05:33	17:05:41	0:00:08	D	103	2987224.2	471176.8	
M38	4	17:06:04	17:06:18	0:00:14	+	267.5	2987131.3	471005	
M39	4	17:08:36	17:09:21	0:00:45	D	886.5	2986756.6	470122	Gas Pipeline
M40	4	17:16:48	17:16:59	0:00:11	D	152.5	2985651.1	467608.3	
M41	4	17:17:14	17:17:25	0:00:11	D	56	2985644.7	467468.7	
M42	4	17:19:05	17:19:13	0:00:08	D	54	2985828.7	466863.1	
M43	4	17:19:26	17:19:36	0:00:10	D	39.5	2985888.1	466760.8	
M44	4	17:19:55	17:20:03	0:00:08	D	32	2985950.5	466589.8	
M45	4	17:21:35	17:21:59	0:00:24	D	393.5	2986139.4	465992.6	
M46	4	17:29:48	17:30:06	0:00:18	D	291	2986220.8	463231.3	
M47	4	17:31:13	17:31:25	0:00:12	D	137	2986312.2	462768.9	Gas Pipeline
M50	4	17:31:56	17:32:13	0:00:17	+	84.5	2986351.2	462521.2	
M51	4	17:34:55	17:35:07	0:00:12	D	292.5	2986453.2	461514.8	

Table 3. Acoustic Anomalies in North Prong Survey Area

Anomaly #	Disk %	Line	Date	Start	Stop	Offset	Latitude	Longitude	X	Y	Notes
A1	1	1	04/09/00	16:15:08		21' starbd	29.46.300	92.15.753	2986036.51	463652.87	Pipe
A2	2	1	04/09/00	16:30:09		35' stbd	29.47.140	92.15.730	2986199.38	468742.85	Debris
A3	3	1	04/09/00	16:39:16		8 to 27' port	29.47.650	92.15.508	2987397.99	471824.30	Snag / tree
A4	3	1	04/09/00	16:40:38		10 to 28' port	29.47.731	92.15.489	2987502.39	472314.40	pipe / cable
A5	5	2	04/09/00	17:02:07	17:02:44	55' stbd	29.46.910	92.15.837	2985622.39	467353.48	debris
A6	5	2	04/09/00	17:08:49	17:08:56	38 - 46' stbd	29.46.583	92.15.752	2986055.70	465368.00	pipe section
A7	8	3	04/09/00	17:45:40	17:45:55	55' stbd	29.47.093	92.15.751	2986086.05	468458.90	oval shape

Table 4. Target Clusters in North Prong Survey Area

Target #	Mag #	Line #	Start	End	Duration	Signature	Gamma	X	Y	COMMENTS
1	M13	2	15:46:27	15:46:38	0:00:11	D	29.5	2987526.2	472329.5	
	M36	3	16:57:47	16:57:57	0:00:10	D	36	2987522.5	472349	
	A4	1	16:40:38					2987502.39	472314.4	pipe/cable
2	M14	2	15:47:26	15:47:45	0:00:19	D	38.5	2987463.6	472026.4	
	M35	3	16:56:55	16:57:09	0:00:14	D	38.5	2987466.3	472039.1	
3	M10	1	15:35:26	15:35:52	0:00:26	D	1490	2986735.5	470197	Gas Pipeline
	M15	2	15:53:40	15:54:21	0:00:41	+	791.5	2986732.5	470164.4	Gas Pipeline
	M34	3	16:51:31	16:52:02	0:00:31	+	798.5	2986760.6	470159.2	Gas Pipeline
	M47	4	17:31:13	17:31:25	0:00:12	D	137	2986312.2	462768.9	Gas Pipeline
4	M17	2	15:58:19	15:58:28	0:00:09	-	56	2986255.2	468847.4	
	M33	3	16:48:03	16:48:17	0:00:13	D	672	2986270.9	468859.7	
5	M7	1	15:30:21	15:30:28	0:00:07	D	950	2986025.5	468451.3	
	M18	2	15:59:47	16:00:04	0:00:17	D	233.5	2986032.4	468436.2	
	M32	3	16:46:39	16:47:16	0:00:37	D	70	2986062.1	468426.4	
6	M31	3	16:41:31	16:41:41	0:00:10	D	50	2985937.8	466566.9	
	M42	4	17:19:05	17:19:13	0:00:08	D	54	2985828.7	466863.1	
7	M3	1	15:21:08	15:21:17	0:00:09	D	180	2986047.1	466136.4	bulkhead near camp
	M19	2	16:07:03	16:07:25	0:00:22	MC	124.5	2986047.40	466241.8	bulkhead near camp
	M30	3	16:40:39	16:40:53	0:00:14	D	149	2986036.9	466276.8	bulkhead near camp
8	M21	2	16:12:22	16:12:48	0:00:26	MC	79.5	2986024.7	464516.3	
	M27	3	16:36:08	16:36:20	0:00:12	-	71	2986030.3	464509.3	
9	M23	2	16:19:14	16:19:30	0:00:16	D	113.5	2986326.4	462385.9	
	M25	3	16:30:33	16:30:47	0:00:14	D	53	2986342.9	462392.8	

Figure 8. Photograph of gas pipeline crossing in survey area (Target #3).

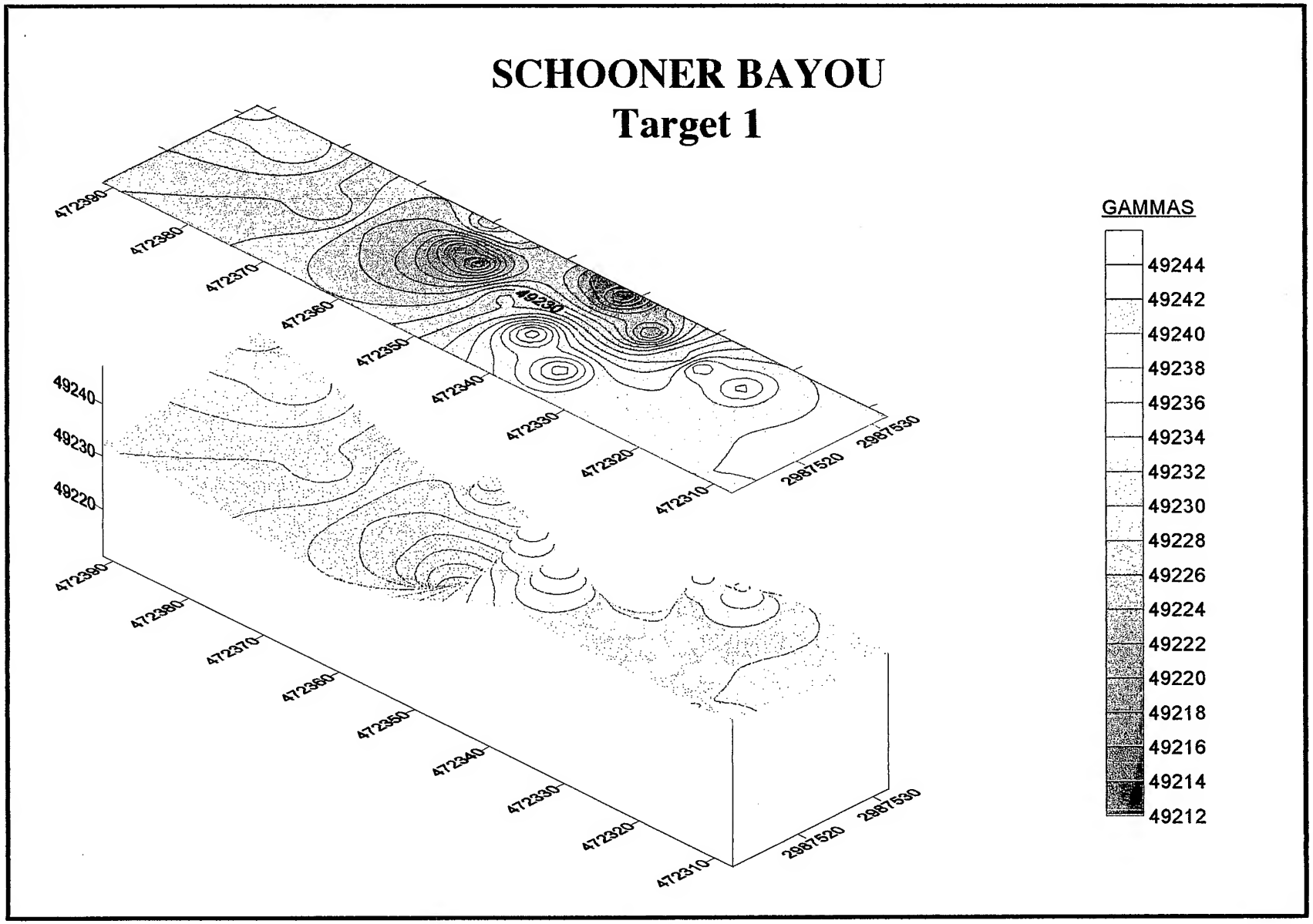

Figure 9. Magnetic contouring of Target #1.

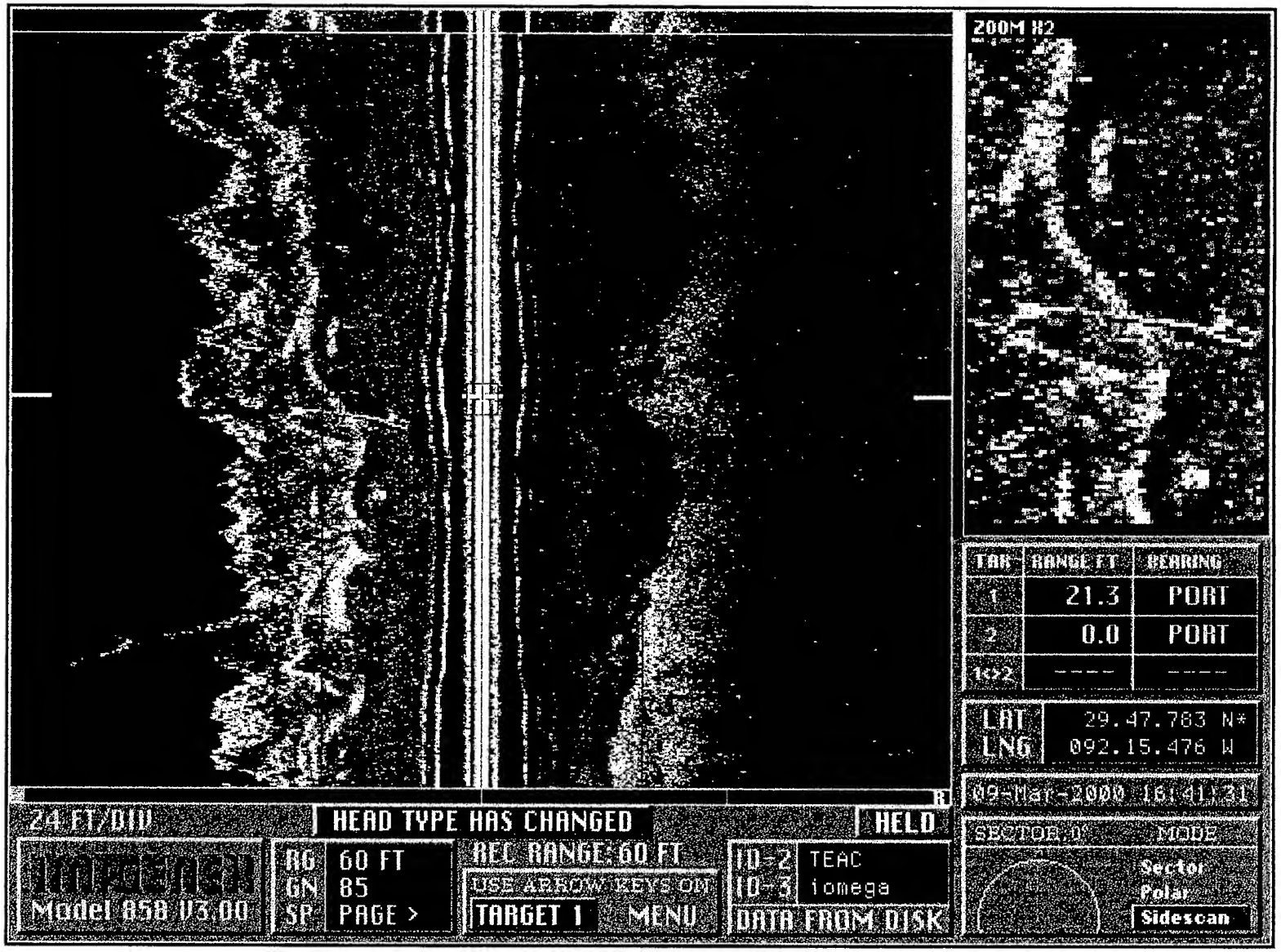

Figure 10. Acoustic image of Target #1.

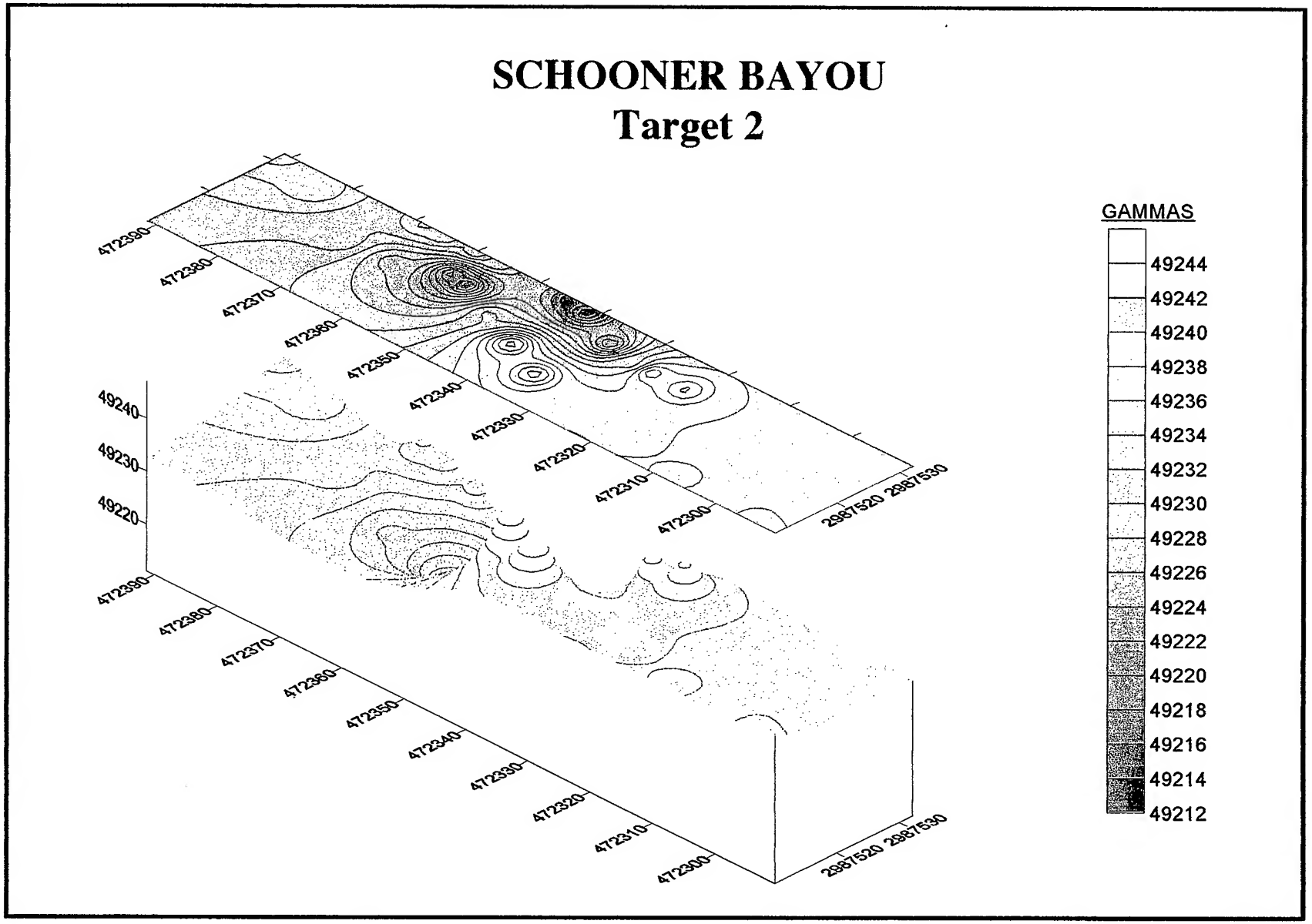

Figure 11. Magnetic contouring of Target #2.

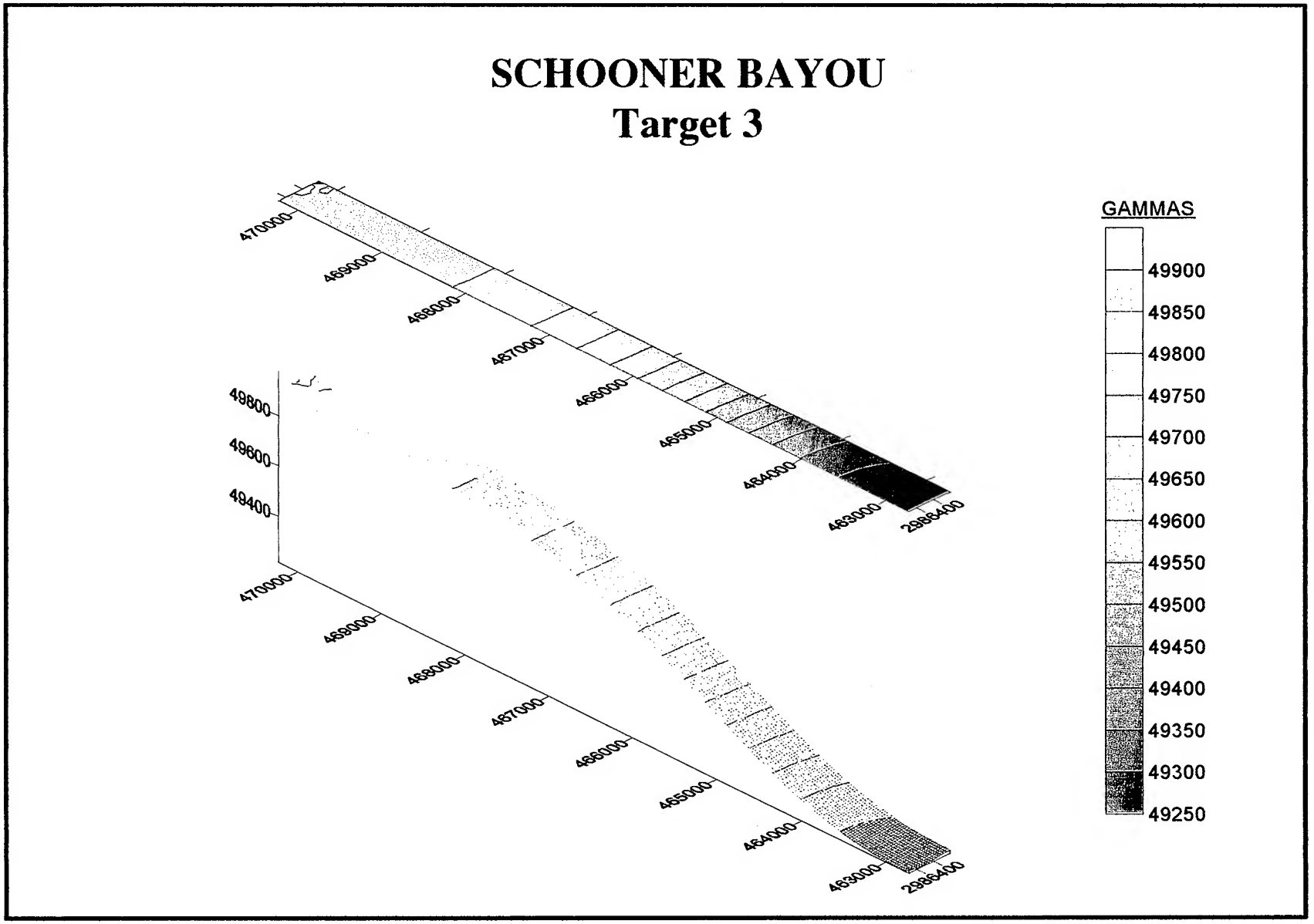

Figure 12. Magnetic contouring of Target #3.

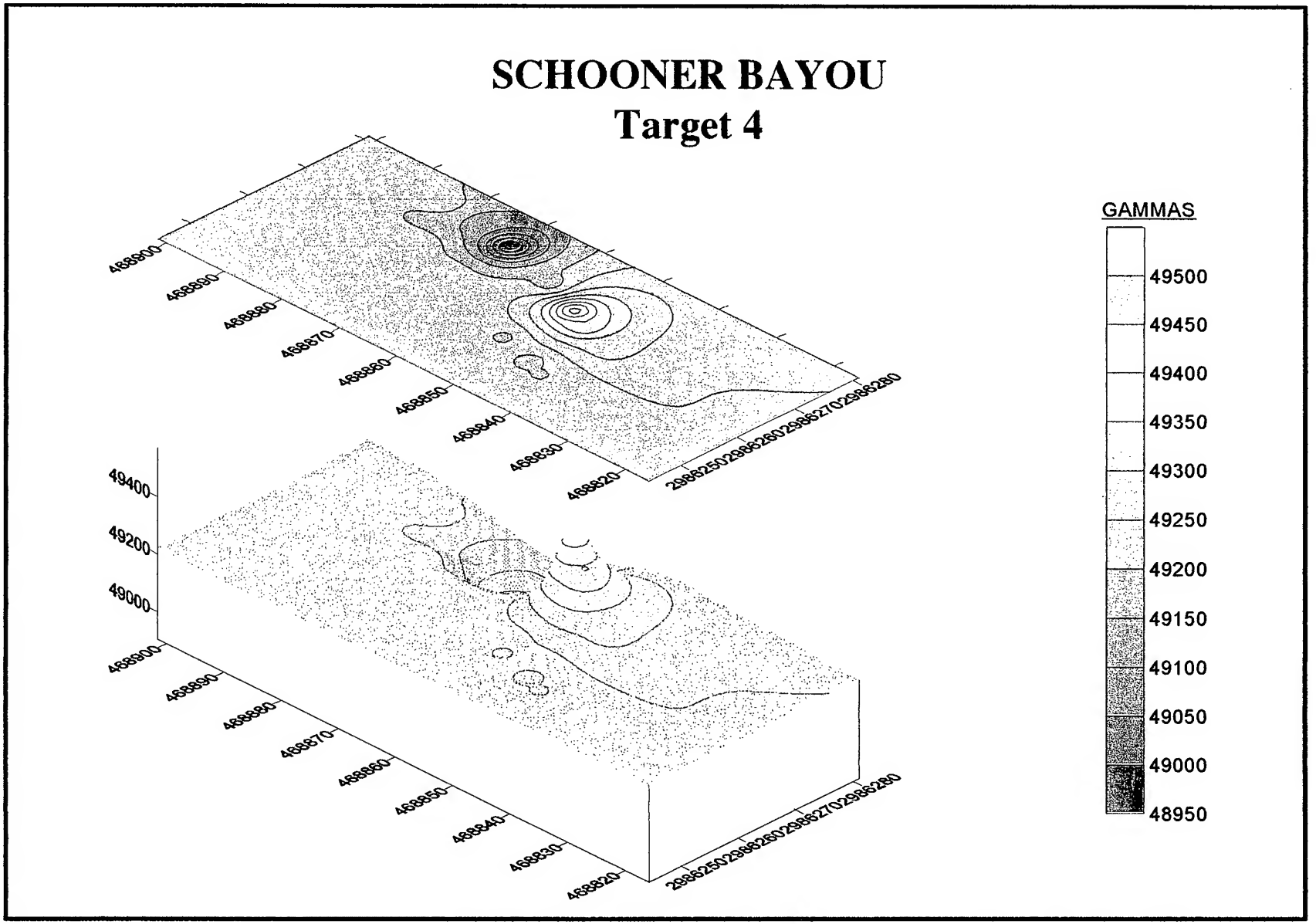

Figure 13. Magnetic contouring of Target #4.

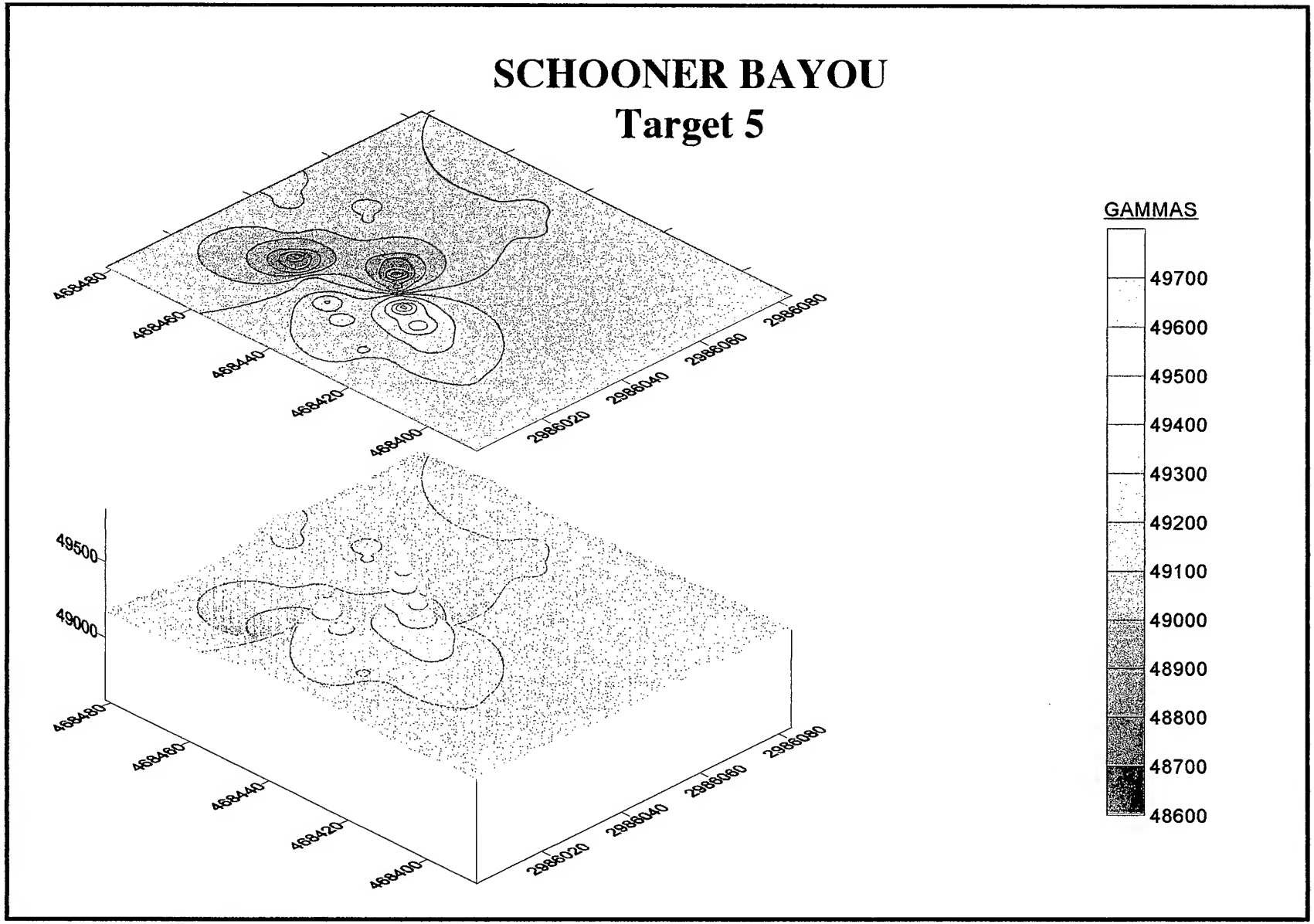

Figure 14. Magnetic contouring of Target #5.

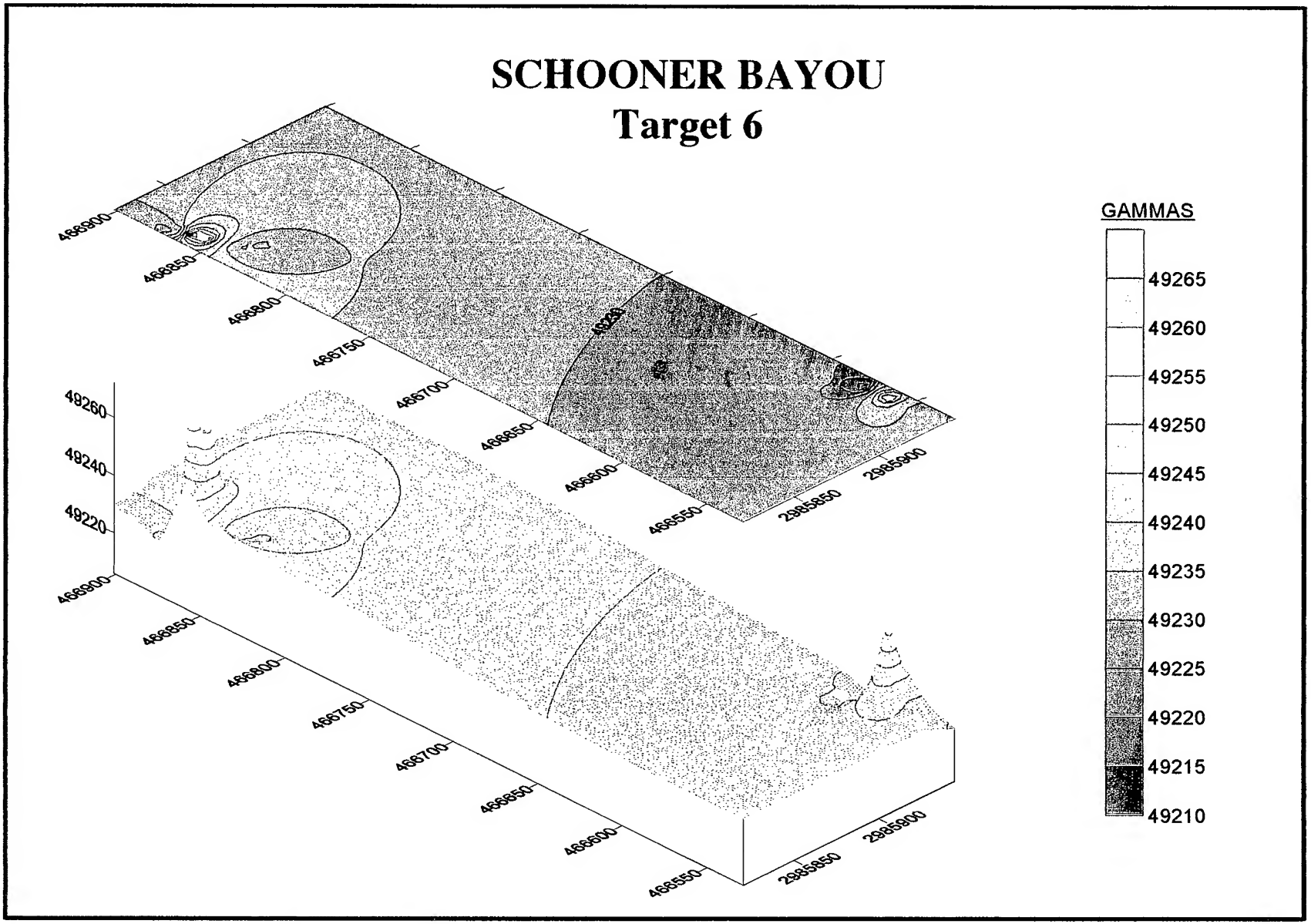

Figure 15. Magnetic contouring of Target #6.

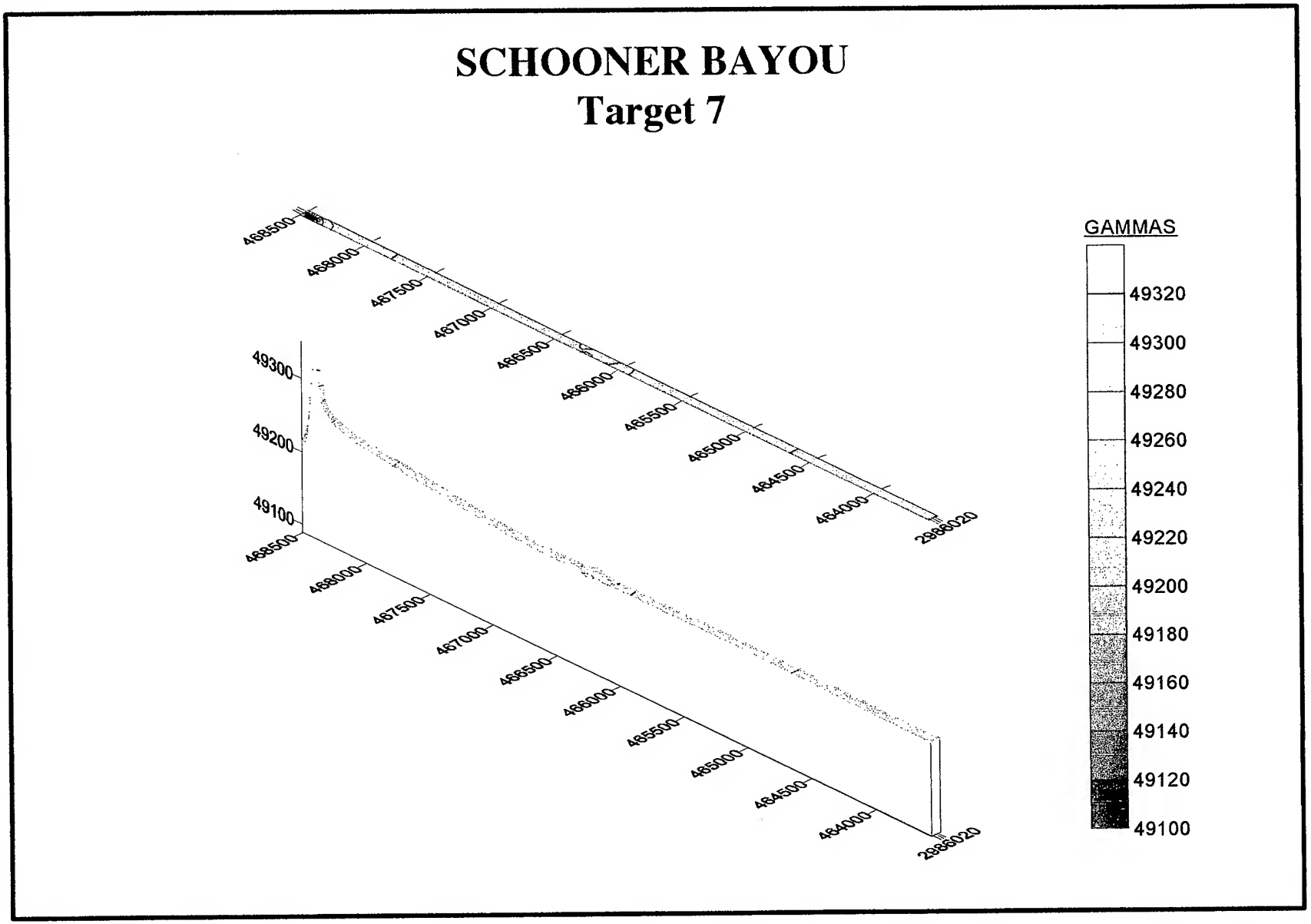

Figure 16. Magnetic contouring of Target #7.

Target #8

Target #8 is comprised of two magnetic disturbances (M21 and M27). M21 is a multi-component anomaly of 79.5 gammas and of medium duration. M27 is a negative monopole of 71 gammas and of short duration (Figure 17). Due to the multi-component nature of the target, additional pattern analysis was undertaken to ascertain the nature of these anomalies. Further analysis indicated that these signatures are not indicative of significant cultural resources and no acoustic anomalies are associated. This target represents an area of modern scattered debris, thus no further work is deemed necessary.

Target #9

Target #9 is comprised of two magnetic anomalies (M23 and M25). Both anomalies are dipoles with short durations. M23 consisted of 113.5 gammas and M25 consisted of 53 gammas (Figure 18). The nature of these signatures is not indicative of significant cultural resources and no acoustic disturbances correlate with this target. This target represents an area of modern scattered debris and no further work is necessary for this target.

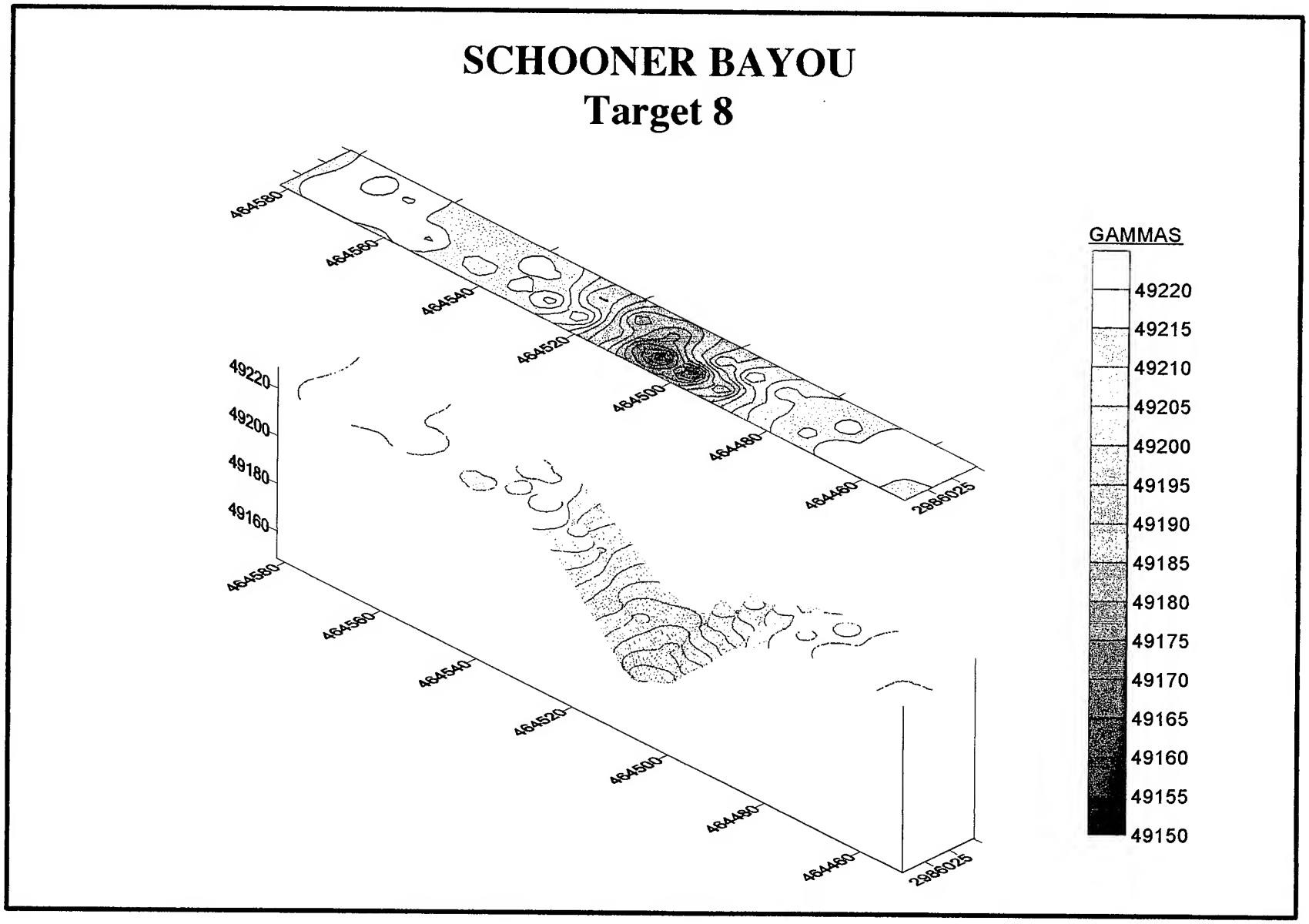

Figure 17. Magnetic contouring of Target #8.

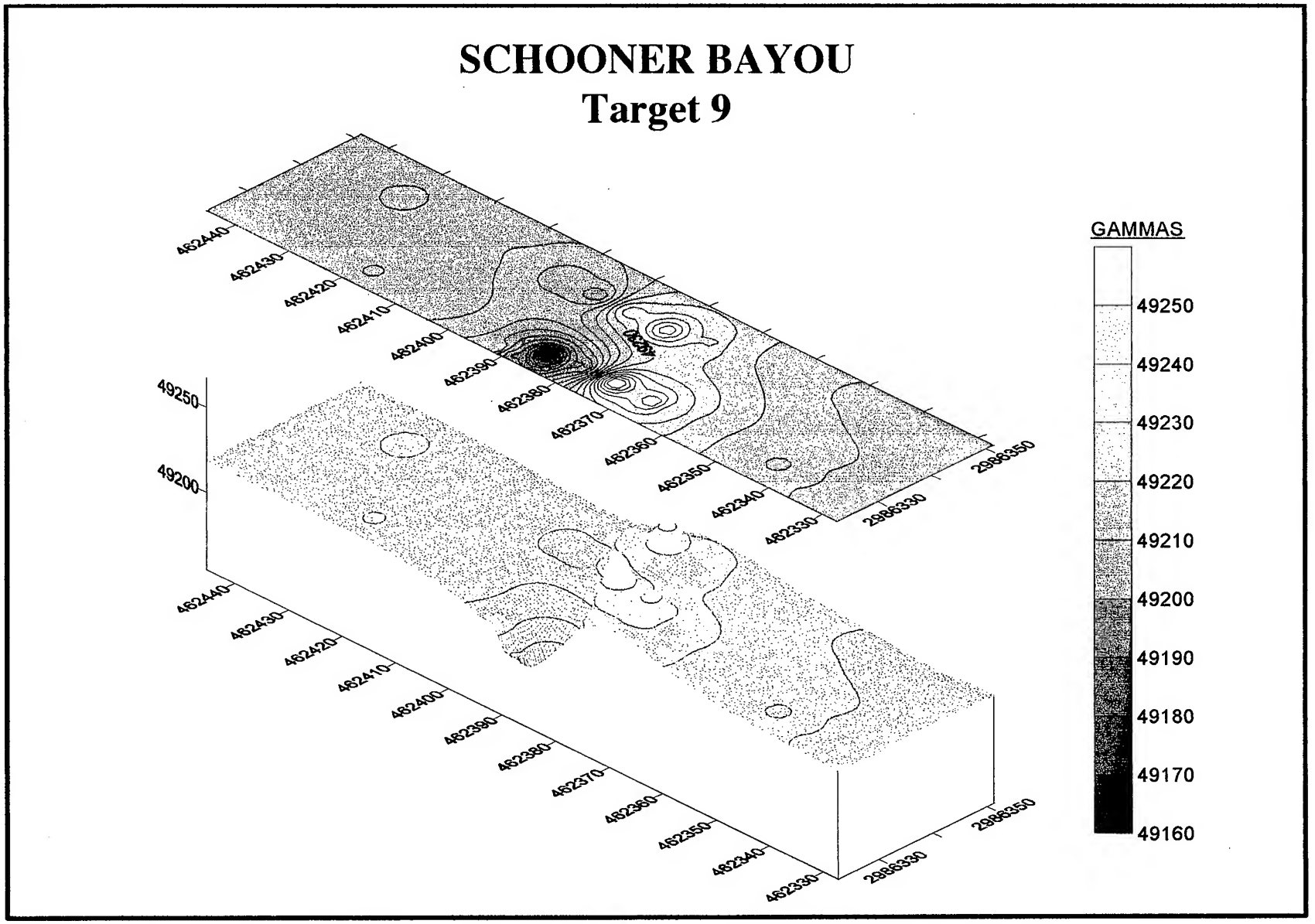

Figure 18. Magnetic contouring of Target #9.

CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

A Phase I Marine Archeological Remote Sensing Survey was conducted along a segment of the North Prong in Schooner Bayou, Vermilion Parish, Louisiana in support of a proposed Bank Line Stabilization project. These investigations were conducted from March 8 – 11, 2000, by R. Christopher Goodwin & Associates, Inc. on behalf of the U.S. Army Corps of Engineers, New Orleans District (USACE-NOD). The project area is located in North Prong, between the GIWW and Schooner Bayou, north of the Schooner Bayou Control Structure (see Figure 2). The proposed repair and maintenance project will require the dredging of the navigation channel in the GIWW and the North Prong.

In keeping with the New Orleans District's mission to preserve, document, and protect significant cultural resources, this magnetic and acoustic remote sensing survey was undertaken to locate potential archeological remains and in so doing, assist the USACE-NOD in satisfying its responsibilities under Section 106 of the National Historic Preservation Act of 1966, as amended. All aspects of the investigations were completed in full compliance with the Scope-of-Work; 36 CFR 800, "Protection of Historic Properties;" the Abandoned Shipwreck Act of 1987 (43 U.S. C. 2101 – 2106); the Abandoned Shipwreck Guidelines, National Park Service; National Register Bulletin Nos. 14, 16, and 20; 36CFR 66; and the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (Federal Register 48, No 190, 1983).

The survey area for this project consisted of one block representing approximately 517 total acres located alternately on both the right and left descending banks of the North Prong. In total, approximately 8.5 linear miles of river bottom were surveyed.

The primary objectives of this study were to identify specific targets that might represent significant submerged cultural resources within the project area, and to provide the USACE-NOD with management recommendations for such resources. These objectives were met with a research design that combined background archival investigations and a marine archeological remote sensing survey.

Vessel Classes not recorded in the Schooner Bayou Study Area

There are a number of reasons for the dearth of sunken vessels in the study area. The primary reason that no remains of the early watercraft were located in the study area is that historically, this region was not as heavily populated as some of the other communities in and around Vermilion Parish. Bateaux and barges had a low probability in the study area, based on water depth and local navigation conditions, and because of a less intensive economic history along this stretch of the bayou. In addition, owners of larger wooden vessels, or later steamboats would have salvaged sunken vessels when practical. Finally, if any sunken vessel had blocked the navigation channels, it is likely that hull removal would have been undertaken, as was the case along Bayou Teche in New Iberia. Consequently, vessels lost in the project

area could have been removed or demolished through salvage soon after their loss. More recent dredging of the bayous by large vessels also could have removed remains of historic watercraft.

In the analysis of magnetic data, particular attention was paid to those magnetic anomalies that comprise areas of high density, clusters of anomalies, and single anomalies of unusually high amplitude, duration, or those exhibiting complex magnetic signatures. A total of 51 individual magnetic anomalies were identified by this survey. Twenty-two of the 51 magnetic anomalies were deemed significant enough to be clustered into 9 target groups for further study. These target groups then were individually magnetically contoured for further analysis.

Additionally, seven individual acoustic anomalies also were detected during the survey of Schooner Bayou. Of these acoustic anomalies, one correlated with two magnetic anomalies (Target #1). All of the acoustic anomalies represent modern disturbances such as pipelines, bulkheads, bank debris, or modern ferrous debris. These anomalies do not represent significant cultural resources.

None of the nine targets represent shipwrecks or other significant cultural resources. Seven of the targets represent modern ferrous scatter (Targets #1, #2, #4 – #6, #8 and #9). One target represents a pipeline (Target #3) and one target represents a bulkhead that is along the riverbank (Target #7).

Further study is not required on any of the nine targets identified; they do not represent significant cultural resources. However, for safety reasons, avoidance is recommended for the pipeline crossing area.

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Special thanks to the engineers of Lealand Bowdin Lock, Vermilion Parish, Louisiana, for their information concerning the survey area. Louisiana Universities Marine Consortium (LUMCON) kindly leased us their boat, *R/V Coli*. Thanks to LUMCON's captain, Mr Samuel Le Bouef, who skillfully maneuvered the survey vessel during the field operations.

At Goodwin and Associates, Inc., R. Christopher Goodwin, PhD., served as Principal Investigator. Jean B. Pelletier, M.A., acted as Project Manager and directed all aspects of the field investigations and data analysis. Sarah A. Milstead, B.A., assisted in the field investigations and with the remote sensing survey, analysis of data, and with preparation of the report. Larkin A. Post, B.A., and Carrie Sowden, B.S., assisted with the analysis of data and preparation of the report. Graphics were produced by Barry Warthen, B.A. The report was produced by Sandi Castle.

APPENDIX I

SCOPE OF WORK

CEMVN-PD-RN February 17, 2000

SCOPE OF SERVICES
Contract No. DACW29-97-D-0018

REMOTE SENSING INVESTIGATION AND
LAND USE HISTORY FOR
BANK LINE STABILIZATION ALONG PORTIONS OF
SCHOONER BAYOU CANAL, NORTH PRONG, & GIWW,
VERMILION PARISH, LA.

I. Introduction

This delivery order calls for two separate tasks to be performed. *Task 1* is a remote sensing survey to identify underwater cultural resources for a bank repair project on the east bank of the North Prong, between the GIWW and Schooner Bayou, near the Schooner Bayou Control Structure. The area to be surveyed is a continuous segment approximately two miles (10,560 feet) in length and 70 feet wide. Attachment 1 illustrates the location of the project area.

Task 2 is to produce a land use history in support of an initial hazardous, toxic, and radioactive waste (HTRW) assessment for the north bank of the GIWW between Herbert Canal and the 7th Ward Canal, along the south bank of the Schooner Bayou Canal between La. Hwy. 82 and Sixmile Canal, and along the east bank of North Prong between the GIWW and Schooner Bayou. The main objective of the research is to assist in the identification of possible HTRW contamination sites in the project area.

The purpose of the proposed bankline stabilization is to repair the existing banks which are allowing saltwater to bypass Leland Bowman Lock and Schooner Bayou Control Structure and to enter the Mermentau River Basin. Bankline repairs in the form of rock dikes comprised of crushed limestone covered with armor stone are needed to stem the flow of saltwater into the basin.

II. Task 1. Remote Sensing Study

1. Project Area

The project area is located along the east bank of North Prong, between the GIWW and Schooner Bayou, near the Schooner Bayou Control Structure. The area to be surveyed is a continuous segment approximately two miles (10,560 feet) in length and 70 feet wide. Attachment 1 illustrates the location of the project area.

2. General Nature of the Work

The fieldwork will include underwater survey methods to identify and record shipwrecks or other cultural resources which may exist in the project area. The underwater investigations will include systematic magnetometer and side-scan sonar survey using precise navigation control. All magnetic and sonar anomalies will be interpreted based on expectations of the character of shipwreck signatures. No diving will be performed under this delivery order.

3. Study Requirements

The study will be conducted utilizing current professional standards and guidelines including, but not limited to:

- the National Park Service's National Register Bulletin 15 entitled "How to Apply the National Register Criteria for Evaluation";
- the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation as published in the Federal Register on September 29, 1983;
- Louisiana's Comprehensive Archaeological Plan, dated October 1, 1983;
- The Advisory Council on Historic Preservation's regulation 36 CFR Part 800 entitled, "Protection of Historic Properties";
- the Louisiana Submerged Cultural Resource Management Plan published by the Division of Archaeology in 1990.

The remote sensing study will be conducted in three phases: Review of Background Sources, Fieldwork, and Data Analyses and Report Preparation.

a. Phase 1: Literature Search and Records Review. The Contractor shall commence, upon work item award, with a literature, map, and records review specific to the study area. This phase shall include a review and synthesis of the archeological, historical and geomorphologic reports covering the study area. The National Register of Historic Places and the State Archeologist's site and shipwreck database files will be consulted to establish a current and complete distribution of historic properties in the study area. At a minimum, the background research and records review will be sufficient for developing the historic context of the study area and should be to a level sufficient for assessing the significance of any sites recorded as a result of the field investigations. The contractor is expected to rely heavily on the recently completed literature search and records review completed under contract DACW29-97-D-0018 (*Cultural Resource Survey for Bankline Stabilization in the vicinity of the Schooner Bayou Control Structure, Mermentau River, Louisiana*) in order to minimize duplication of work and minimize project cost.

b. Phase 2: Fieldwork. Upon completion of Phase 1, the contractor shall proceed with execution of the underwater survey.

The equipment array required for the remote sensing investigation will include:

(1) a marine magnetometer,
(2) a positioning system,
(3) and a side-scan sonar system.

The following requirements apply to the underwater survey:

(1) transect lane spacing will be at least 25 feet and no greater than 100 feet;
(2) positioning control points will be obtained at least every 100 feet along transects;
(4) background noise will not exceed +/- 3 gammas;
(5) magnetic data will be recorded on 100-gamma scale;

(6) the magnetometer sensor will be towed a minimum of 2.5 times the length of the boat or projected in front of the survey vessel to avoid noise from the survey vessel;

(7) the survey will utilize the Louisiana State Plane Coordinate System (NAD 1983);

(8) a metal probe will be used to identify the boundaries of any potentially significant sites in the project area.

c. Phase 3: Data Analyses and Report Preparation. All data collected in conjunction with this investigation will be analyzed using currently acceptable scientific methods and will be conducted in accordance with the contractor's proposal. The post-survey data analyses and report presentation covering the underwater survey results will include as a minimum:

(1) post-plots of survey transects and data points;

(2) same as above with magnetic data included;

(3) plan views of all potentially significant anomalies showing transects, data points and contours; and

(4) correlation of magnetic, sonar, and fathometer data, where appropriate.

The interpretation of identified magnetic anomalies will rely on expectations of the character (i.e., signature) of shipwreck magnetics derived from the available literature. Interpretation of anomalies will also consider probable post-depositional impacts and the potential for natural and modern, i.e., insignificant, sources of anomalies. The Contractor will file state site forms with the Louisiana State Archeologist and cite the resulting state-assigned site numbers in the final report for any anomaly classified as a site.

The draft and final reports will present the results of the survey and recommendations for any additional work. An inventory of all anomalies recorded during the underwater survey, with recommendations for further identification and evaluation procedures will be included as appropriate. The discussions must include justifications for the selection of specific targets for further evaluation. The potential for each target or submerged historic property to contribute to archeological or historical knowledge will be assessed. Thus, the Contractor will classify

each anomaly as either potentially eligible for inclusion in the National Register, or not eligible. Sonar images of potentially significant anomalies should be referenced and included in the report.

The contractor shall fully support his recommendations regarding site significance. The report will include a summary table listing all anomalies. At a minimum, the table will include the following information: project name; survey segment/area; magnetic target number; gammas intensity; target coordinates, target size, association, description of sonar data.

Reports are to include an assessment of potential significance and recommendations for further work. Recommendations for equipment and methodology to be employed in future evaluation studies must be discussed in detail. Additional requirements for the management summary, draft, and final reports are contained in Section 5 of this Scope of Services.

4. Management Summary, Draft and Final Reports

A management summary is to be provided within 2 weeks of completion of the fieldwork. This management summary must contain at minimum a summary of the field conditions, a listing of identified anomalies and sites (a table is sufficient), and preliminary recommendations of site significance and recommendations for further work.

Five copies of a draft report integrating all phases of this investigation will be submitted to the COR for review and comment within 16 weeks after the date of the award. The final report shall follow the format set forth in MIL-STD-847A with the following exceptions: (1) separate, soft, durable, wrap-around covers will be used instead of self covers; (2) page size shall be 8-1/2 x 11 inches with 1-inch margins; (3) the reference format of American Antiquity will be used. Spelling shall be in accordance with the U.S. Government Printing Office Style Manual dated January 1973.

The COR will provide all review comments to the Contractor within 8 weeks after receipt of the draft reports (24 weeks after date of order). Upon receipt of the review comments on the draft report, the Contractor shall incorporate or resolve all comments and submit one preliminary copy of the final report to the COR

within 5 weeks (29 weeks after date of order). Upon approval of the preliminary final report by the COR, the Contractor will submit 1 reproducible master copy, 1 copy on floppy diskette, 35 copies of the final report, and all separate appendices to the COR within 30 weeks after date of order. A copy of the Scope of Services shall be bound as an appendix with the Final Report. The Contractor shall also supply a complete listing of all computer files submitted. This listing will include file names, file types, disk number, and file description.

5. Weather Contingencies

The potential for weather-related delays during the underwater survey necessitates provision of one weather contingency day in the delivery order. If the Contractor experiences unusual weather conditions, he will be allowed additional time on the delivery schedule but no cost adjustment.

6. Attachments

Attachment 1. Map showing the study area

III. Task 2: HTRW Land Use History

1. Project Area The study area consists of a corridor centered on the project alignment, which includes the north bank of the GIWW between Herbert Canal and the 7th Ward Canal, along the south bank of the Schooner Bayou Canal between La. Hwy. 82 and Sixmile Canal, and along the east bank of North Prong between the GIWW and Schooner Bayou. The project area is approximately 12.5 miles (66,000 feet) in length. The width of the project area is one mile from each bank or just over two miles total. Attachment 2 is a map showing the project area.

2. General Nature of the Work The purpose of this study is to produce a land use history in support of an initial hazardous, toxic, and radioactive waste (HTRW) assessment. The main objective of the research is to assist in the identification of possible HTRW contamination sites in the project area.

3. Background Information Corps of Engineers guidance on HTRW aspects of water resources planning is provided in Engineer Regulation 1165-2-132. This contract effort will support an initial HTRW assessment (section 7 of the referenced regulations)

now underway by New Orleans District personnel. Normally such an assessment includes several avenues of investigation including:

a. research of historic and present land uses,

b. consultation with EPA and state and local regulatory and response agencies involved in HTRW, and

c. site investigations by experienced and qualified personnel.

The work to be performed under this delivery order is limited to items a. and b. above.

4. Government Provided Information Upon award of this delivery order, the NOD will provide to the contractor pertinent information in its files regarding the study area. This information includes the Tobin database of oil and gas well sites.

5. Study Requirements The study will be conducted utilizing current professional standards and guidelines for historical research and HTRW initial assessments.

The study will be conducted in two phases: Historical Research and Records Review, and Data Analysis and Report Preparation.

A. Phase 1. Historical Research and Records Review. The first phase of this project will consist of comprehensive literature research and records review to develop the land use histories of the various portions of the study area. The research will focus on land uses from 1900 to the present. Further, the research will concentrate on commercial and industrial uses since these are more likely to be associated with hazardous wastes. Because the project area may have been contaminated by commercial and industrial activities outside its boundaries, the contractor will document all commercial and industrial land uses of properties to one mile on both sides of the bayous and canals.

Detailed information on residential land uses is not required, but the historic context of the study area must be established.

Sources consulted during the research will include, but not be limited to, the following:

(1) post-1900 historic maps and aerial photographs;

(2) real estate and insurance records;

(3) local and regional historic archives, city directories and other public records;

(4) Federal, state and local industrial and commercial census records;

(5) geological data and reports; and

(6) formal contact with and/or inspection of Environmental Protection Agency (EPA), Louisiana Department of Environmental Quality (LDEQ), Coast Guard, and other applicable Federal, state and local regulatory/response agencies records (additional information on agency searches provided below).

Oral histories and/or interviews with knowledgeable persons (e.g. public agency employees, local environmental advocates, residents, etc.) will also be conducted as appropriate.

Contact with and/or inspection of public agency records is intended to document license and permit actions, HTRW violations, enforcement actions, past or pending litigation, illegal dumping, and known contamination sites. The contractor consultation with the Environmental Protection Agency (EPA); at a minimum, will include the inspection of the Regional Site Assessment files, the CERCLIS inventory list and the RCRIS inventory list. Pertinent information from LDEQ will be acquired by contacting and inspecting records at the following offices: 1) the Office of Solid and Hazardous Waste; 2) the Office of Water Resources; 3) the Office of Air Quality and Radiation Protection: and 4) the Office of Legal Affairs and Enforcement, Inactive and Abandoned Sites Div. In addition to EPA and LDEQ, records from the following state agencies need to be examined: 1) the Louisiana Department of Natural Resources, Office of Conservation and Office of Coastal Restoration and Management (Tobin oil and gas well maps are available for contractor use); 2) the Louisiana Department of Agriculture and Forestry, Office of Agricultural & Environmental Sciences (Division of Pesticide Waste Control); and

3) the Louisiana Department of Health and Hospitals, Office of Public Health. Additional agencies to be consulted include the Public Safety Services of the Louisiana Department of Public Safety and Corrections for information on spills and releases reported to the Hazardous Materials Hotline, and the appropriate parish Offices of Civil Defense or Emergency Preparedness.

Special attention will be focused upon oil and gas activities, pipelines, and industrial land uses. Information from the Tobin and DNR databases as well as other sources will be used to document well locations, areas of NORM concern, metering stations, unclosed pits, spills, and field pipeline systems in the study area. All pipelines within the study area will be documented with special emphasis on early, pre-regulation lines (e.g. pre-1959). Current industrial facilities in the study area will be an important focus of the research. However, the research will also address the historical practices of these facilities as well as now defunct facilities to identify areas of potential HTRW concern which would escape a cursory review of current site conditions.

B. Phase 2. Data Analyses and Report Preparation. The historical data and information obtained from agency consultations will be sorted, categorized and evaluated in order to present an exhaustive, chronological discussion of the study area's land use history. The text will be organized by project areas as appropriate. The land use history report shall contain, but not be limited to the following:

(1) A description of the project area and proposed government action;

(2) a discussion of research methods and analytical techniques;

(3) the types, sources, location, adequacy and availability of pertinent documentation;

(4) the analysis and interpretation of aerial photos and other remote sensing data;

(5) an exhaustive, chronological discussion of the study area's land use history. This history will culminate in a comprehensive listing and discussion of commercial and industrial land uses of potential HTRW concern. For each

facility or location of potential HTRW concern, the Contractor will summarize all relevant information obtained through the historical research and agency consultations. The minimum acceptable data is the name of the company or facility, the dates of usage or operation, the type of business or activity, and its location. All other data gathered which may help to identify the types of chemicals in use, the disposal methods, the ownership or employees of the company or facility will also be provided.

(6) figures, tables, graphs, maps and photographs to complement the narrative, provide additional detail, and illustrate the layout of known or potential HTRW sites. Any plan maps showing locations of buildings and/or activity areas will be copied and provided in (or with) the draft report;

(7) an appendix listing all sources consulted during the research will be included in the report. Included in this listing will be the agency and/or organizational name, a point of contact, date(s) of contact, and a brief assessment of the research value of the source. Sources that proved to be fruitless shall also be listed;

(8) a separate appendix which provides a copy of correspondence with regulatory/response agencies, as well as printouts and other data received from these agencies, will be provided in the report; and

(9) as a separate deliverable with the draft reports, all areas and/or facilities of potential HTRW concern shall be plotted on Intergraph design files of the study area. The COR will provide the Intergraph base maps of the project area to the Contractor no later than four weeks after delivery order award. These maps will serve as the base map or reference file for the Contractor's preparation of files delineating and identifying all potential HTRW problem areas in the study area. The details of the mapping effort (e.g. what levels for what data, line weights, database information, etc.) will be established by the COR when the base map is provided to the Contractor.

6. Reports Four copies of the draft report integrating all phases of this investigation will be submitted to the COR for review and comment within 8 weeks after delivery order award.

Along with the draft reports, the Contractor shall submit two copies of a spiral-bound appendix containing copies of correspondence with regulatory/response agencies, as well as printouts and other data received from these agencies.

The written report shall follow the format set forth in MIL-STD-847A with the following exceptions: (1) separate, soft, durable, wrap-around covers will be used instead of self covers; (2) page size shall be 8-1/2 x 11 inches with 1-inch margins; (3) the reference format of American Antiquity will be used; (4) page numbering with Arabic numerals will begin with the first page of chapter 1 of the report. Spelling shall be in accordance with the U.S. Government Printing Office Style Manual dated January 1973.

The COR will provide all review comments to the Contractor within 4 weeks after receipt of the draft reports (12 weeks after work item award). Upon receipt of the review comments on the draft report, the Contractor shall incorporate or resolve all comments and submit one preliminary copy of the final report to the COR within 2 weeks (14 weeks after work item award). Upon approval of the preliminary final report by the COR, the Contractor will submit 10 copies and one reproducible master copy of the final report to the COR within 16 weeks after work item award. The Contractor will also provide computer disk(s) of the text of the final report in Microsoft Word for Windows or other approved format and copies of any spreadsheet, database, and Intergraph files developed during the project.

7. Attachments

1. Attachment 2. Map of HTRW project area

APPENDIX II

RESUMES OF KEY PROJECT PERSONNEL

JEAN B. PELLETIER, M.A.
NAUTICAL ARCHAEOLOGIST/REMOTE SENSING SPECIALIST

Jean B. Pelletier, M.A., graduated from the University of Maine in 1991 with a Bachelors degree in Geological Sciences, and received a Master of Arts degree in History from the University of Maine in 1998. His research interests include maritime history and nautical archaeology, steamboat technology, industrial technology, remote sensing, geophysics, scientific diving technology, and underwater photography/videography. Mr. Pelletier has formal training in marine geophysics, remote sensing, remotely operated vehicles, and diving safety, and has conducted archaeological, archival, and geophysical investigations in Connecticut, Delaware, Louisiana, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Virginia. As a graduate student at the University of Maine, Mr. Pelletier worked with Dr. Warren C. Riess as a research assistant on the Penobscot Expedition Phase II, conducting remote sensing and underwater documentation of the ships of the Penobscot Expedition.

Before joining Goodwin and Associates Inc. in 1997, Mr. Pelletier served as an archeological and scientific diving consultant for several universities and public utility companies along the Atlantic seashore. In this capacity, Mr. Pelletier managed the recovery of nine cannons from the *Nottingham Galley*, an eighteenth century English merchant ship lost on the ledges of Boon Island, Maine.

Since joining Goodwin & Associates Inc., Mr. Pelletier has been involved in numerous Phase I, II, and III archaeological investigations of underwater sites. He has conducted remote sensing surveys in the Gulf of Mexico, Chesapeake Bay, and a Phase III recordation of the steamboat *Kentucky*, a confederate troop-transport lost on the Red River in 1865, near Shreveport, Louisiana. Mr. Pelletier's professional affiliations include: American Academy of Underwater Sciences, Marine Archaeology and Historical Research Institute (MAHRI), and the Society for Historical Archaeology.

SARAH A. MILSTEAD POST
NAUTICAL ARCHAEOLOGIST / SCIENTIFIC DIVER/ ASSISTANT CONSERVATOR

Sarah Milstead Post graduated from the University of Texas at Austin in 1995 with a Bachelors degree in Archaeology. Mrs. Post will be receiving a Masters of Arts degree in Maritime History and Nautical Archaeology from East Carolina University in 2000. Her experience and education in nautical archaeology has led to interests in remote sensing, scientific diving, ship construction, maritime history, cultural resource management, and conservation. She has formal training in all of these areas and has been involved with projects in Texas, Louisiana, North Carolina, Virginia, Bermuda, Belize, and Maine. As an undergraduate, Ms. Post worked as an intern for Barto Arnold at the Texas Historical Commission (THC) dealing with all phases of underwater archaeology. She was also on the team of nautical archaeologists with the THC in 1995 that discovered the *La Belle Wreck* that dates to the seventeenth century.

Before joining Goodwin and Associates Inc. in 1999, Mrs. Post was a crew chief for field schools at East Carolina University while also finishing classes for her Masters degree. She has worked on many nineteenth century sites mapping, excavating, and conserving artifacts from shipwrecks. Since joining Goodwin & Associates Inc., Mrs. Post has conducted Phase I marine remote sensing surveys in Louisiana and Virginia, and Phase II underwater surveys dealing with historic and prehistoric surfaces in Louisiana, Alabama, Florida, Virginia, and Maryland. She has also conserved many land and underwater artifacts dating from the seventeenth century to the nineteenth century. Mrs. Post's professional affiliations include: the Society of Historical Archaeology and American Academy of Underwater Sciences.

LARKIN A. POST, B.A.
NAUTICAL ARCHEOLOGIST/DIVE SAFETY OFFICER

Larkin A. Post graduated from the University of Maine in 1995 with a double major in anthropology and history. He attended the Maritime History and Nautical Archaeology program at East Carolina University (ECU). At that institution organized and led the largest student project in the program's history, for which work he should receive his M.A. in late 1999. Mr. Post is also a fully certified NAUI scuba instructor, ASHI first aid & CPR instructor, and American Red Cross Water Safety Instructor. As Goodwin and Associate's Dive Safety Officer (DSO) Mr. Post is responsible for all dive operations of the company and maintain Goodwin's status as currently the only private company that is a member of the prestigious American Academy of Underwater Sciences.

Mr. Post grew up working on the family's coastal Maine island and worked on local fishing boats from a young age. In spite of this he still retains a research interests in nautical archaeology, naval history and maritime industrial technology. Professional interests include remote sensing, navigation, remote piloted vehicle operation, and technical scuba diving. These skills have allowed Mr. Post to work on Phase I, II, III maritime archaeological projects in Maine, Massachusetts, Maryland, North Carolina, Bermuda, and Louisiana.

Before joining Goodwin and Associates, Mr. Post served as remote sensing and boat specialist for ECU. He also helped teach classes in remote sensing and was in charge of logistical setup and day to day operation several of the university's maritime projects. Finally for ECU he served as crew chief of the Castle Island, NC field school and as interim DSO for the project.

CATHERINE M. LABADIA, M.A., A.B.D.
PROJECT MANAGER

Ms. Labadia received her Bachelor of Arts in Anthropology from Central Connecticut State University in 1991. She earned her Master of Arts degree in Anthropology from the University of Connecticut in 1996. She currently is enrolled at the Pennsylvania State University where she is a doctoral candidate in the Department of Anthropology. Ms. Labadia's dissertation research interest is focused on the application of Geographic Information Systems to predictive modeling in archeology.

Ms. Labadia has received several academic awards including the State of Connecticut Academic scholarship, Central Connecticut State University Anthropology Department Honors Award, and the Sigma-Xi Grant in Aid or Research. As a result of these scholarships and her academic achievement, Ms. Labadia has presented several scholarly papers at the *Society for American Archaeology, Joint Symposium of the Ontario Archaeological Society and the Midwest Archaeological Society,* and other local archeological societies. Ms. Labadia also has acquired special skill and training in the areas of geologic thin-sectioning, computer-aided drafting, Geographic Information Systems operation, artifact photography, and technical writing during her academic training.

Ms. Labadia also has participated in numerous cultural resources management projects. These project ranged from small Phase I surveys to Phase II eligibility testing and large Phase III mitigation projects. She also has participated in the conservation and curation of artifacts recovered during cultural resources management survey as part of her job duties at the Mashantucket Pequot archaeological conservation facility in Storrs, Connecticut. Her conservation and curation duties included cleaning, restoration, stabilization, photography, and packaging of metal, bone, shell, ceramic, and lithic artifacts recovered from the Mashantucket Pequot Reservation in Lyme, Connecticut during cultural resources management projects.

Physical Anthropology: Ms. Labadia, as part of her undergraduate education, was enrolled in several classes concerning human skeletal analysis and genetics. She is conversant with the fundamentals of skeletal analysis, including determining age and sex of skeletons, identification of skeletal elements, measurement of cranial and post-cranial remains, and the identification of traumas and pathologies.

NAGPRA Experience: Ms, Labadia has participated in identification, analysis, and reversal of conservation procedures applied to Native American skeletal remains from the Fitzgerald Site, a Niantic burial ground located in East Lyme, Connecticut. In addition, Ms. Labadia also was responsible for the reversal of conservation procedures applied to objects associated with the burials from the Fitzgerald Site. This involved the restoration of metal, ceramic, bone, and shell artifacts to their original condition. All of this work was completed prior to and in anticipation of the reburial of the skeletal remains and associated objects at a selected site in Connecticut.

Curation/Conservation: Ms. Labadia has participated in the inventorying and analysis of dozens of archeological collections from sites throughout southern New England. In addition, she has specific training, in the conservation and curation of metal, shell, bone, lithic, and ceramic artifacts from both prehistoric and historic archeological sites. Her conservation experience involves materials analysis and stabilization, in addition to the use of specialized conservation equipment, including air-abrasive units, conductivity meters, ultrasonic cleaning equipment, and specialized photographic equipment.

Regional Experience: Connecticut, Rhode Island, and New Zealand

CARRIE E. SOWDEN, B.S.
REMOTE SENSING TECHNICIAN

Ms. Carrie Sowden received a Bachelor of Science degree from Emory University where she studied Chemistry with a minor in History. She held an internship at the University of Maine, Darling Marine Center as an historical / archaeological intern. While there she started and maintained artifacts for conservation from an underwater site as well as participated in phase II project for the *Angel Gabrial*. She is an Advanced SCUBA diver with Divemaster training.

Since joining R. Christopher Goodwin & Associates, Inc. in January, 2000, Ms. Sowden has been involved with marine artifact conservation and nautical data analysis.